2022 ANNUAL REPORT
FORMER FORT ORD SITE 39 HABITAT RESTORATION
CONTRACT NO. W91238-18-D-0007
TASK ORDER W9123821F0083

FORMER FORT ORD

Prepared for:
US Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814-2922

Prepared by:
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BURLESON CONSULTING INC.
A Terracon Company

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CONTENTS

Section **Page**

FIGURES

TABLES

APPENDICES

ACRONYMS AND ABBREVIATIONS

Army	US Department of the Army
AMP	Adaptive Management Plan
BRAC	Base Realignment and Closure
Burleson	Burleson Consulting Inc., A Terracon Company
BMP	Best Management Practice
CDFA	California Department of Food and Agriculture
Kemron	Kemron Environmental Services, Inc.
HA	Historic Area
HA 27A North	Northern polygons located at HA 27A
HA 27A South	Southern polygon located at HA 27A
HMP	Habitat Management Plan
HRP	Habitat Restoration Plan
lb	Pound
Monitoring Protocol	Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Management Plan at Former Fort Ord
NA	Not Applicable
NF	Native Forb (Annual Herbs/Forbs)
NNF	Non-Native Forb
NNP	Non-Native Perennial (Shrubs and Perennial Herbs/Forbs)
NP	Native Perennial
Propagation Protocol	Site 39 Plant Material Collection, Storage, and Propagation Protocols
PWS	Performance Work Statement
Site 39	Site 39 Inland Ranges
SSRP	Site Specific Restoration Plan
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
UXO	Unexploded Ordnance
°F	Degrees Fahrenheit

SPECIES LIST AND CODES

Scientific Name	Common Name	Code	Category
Acacia sp.	acacia	AC	NNP
Achillea millefolium	common yarrow	ACMI	NP
Acmispon americanus var. *americanus*	Spanish clover	ACAMA	NF
Acmispon glaber	deerweed	ACGL	NP
Acmispon heermannii var. *orbicularis*	Heermann's lotus	ACHEO	NP
Acmispon parviflorus	hill lotus	ACPA	NF
Acmispon strigosus	Bishop's lotus	ACST	NF
Acmispon wrangelianus	Chile lotus	ACWR	NF
Adenostoma fasciculatum	chamise	ADFA	NP
Agoseris apargioides	coast dandelion	AGAP	NP
Agoseris grandiflora	large-flowered agoseris	AGGR	NP
Agoseris heterophylla var. *cryptopleura*	California annual agoseris	AGHEC	NF
Agoseris sp.	agoseris	AG	
Agrostis avenacea	Pacific bent grass	AGAV	NNP
Agrostis exarata	spike bent grass	AGEX	NP
Agrostis hallii	Hall's bent grass	AGHA	NP
Agrostis pallens	leafy bent grass	AGPA	NP
Aira caryophyllea	silver hair grass	AICA	NNF
Amsinckia intermedia	common fiddleneck	AMIN	NF
Amsinckia spectabilis var. *spectabilis*	Seaside fiddleneck	AMSPS	NF
Anaphalis margaritacea	pearly everlasting	ANMA	NP
Aphanes occidentalis	Western lady's mantle	APOC	NF
Arbutus menziesii	Pacific madrone	ARME	NP
*Arctostaphylos hookeri**	Hooker's manzanita	ARHO	NP
*Arctostaphylos montereyensis**	Monterey manzanita	ARMO	NP
*Arctostaphylos pumila**	sandmat manzanita	ARPU	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Artemisia californica	California sagebrush	ARCA	NP
Artemisia douglasiana	mugwort	ARDO	NP
Artemisia pycnocephala	coastal sagewort	ARPY	NP
Asteraceae sp.	daisy species	AS	
Atriplex semibaccata	Australian saltbush	ATSE	NNP
Avena barbata	slender wild oat	AVBA	NNF
Avena fatua	wild oat	AVFA	NNF
Avena sp.	wild oat	AV	NNF
Baccharis glutinosa	salt marsh baccharis	BAGL	NP
Baccharis pilularis	coyote brush	BAPI	NP
Baccharis salicifolia	mule fat	BASA4	NP
Bowlesia incana	hoary bowlesia	BOIN3	NF
Brassica nigra	black mustard	BRNI	NNF

Scientific Name	Common Name	Code	Category
Briza maxima	rattlesnake grass	BRMA	NNF
Briza minor	small quaking grass	BRMI	NNF
Brodiaea terrestris ssp. *terrestris*	dwarf brodiaea	BRTET	NP
Bromus carinatus	California brome	BRCA	NF
Bromus diandrus	ripgut brome	BRDI	NNF
Bromus hordeaceus	soft chess	BRHO	NNF
Bromus madritensis ssp. *rubens*	foxtail chess	BRMAR	NNF
Calandrinia breweri	Brewer's redmaids	CABR3	NF
Calandrinia menziesii	red maids	CAME	NF
Callitriche heterophylla	water starwort	CAHE3	NP
Calochortus albus	white globe lily	CAAL	NP
Calyptridium monandrum	common pussypaws	CAMO	NF
Camissonia contorta	contorted primrose	CACO	NF
Camissonia strigulosa	sandysoil suncup	CAST20	NF
Camissoniopsis cheiranthifolia	beach evening primrose	CACH	NP
Camissoniopsis micrantha	small primrose	CAMI	NF
Cardionema ramosissimum	sand mat	CARA	NP
Carduus pycnocephalus ssp. *pycnocephalus*	Italian thistle	CAPYP	NNF
Carex barbarae	Santa Barbara sedge	CABA	NP
Carex brevicaulis	short stem sedge	CABR8	NP
Carex globosa	round-fruited sedge	CAGL	NP
Carex praegracilis	clustered field sedge	CAPR	NP
Carex sp.	sedge	CA	NP
Carex tumulicola	foothill sedge	CATU	NP
Carpobrotus edulis	hottentot fig	CAED	NNP
Castilleja affinis	coast paint-brush	CAAF	NP
Castilleja ambigua ssp. *ambigua*	Johnny nip	CAAMA3	NF
Castilleja attenuata	narrow leaved owl's clover	CAAT	NF
Castilleja densiflora	owl's clover	CADE	NF
Castilleja exserta ssp. *exserta*	purple owl's-clover	CAEX	NF
Castilleja foliolosa	woolly indian paintbrush	CAFO2	NP
Ceanothus dentatus	dwarf ceanothus	CEDE	NP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Ceanothus thyrsiflorus	blueblossom	CETH	NP
Ceanothus thyrsiflorus var. *griseus*	Carmel ceanothus	CETHG	NP
Centaurea melitensis	tocalote	CEME	NNF
Cerastium glomeratum	sticky mouse-ear chickweed	CEGL	NNF
Chenopodium californicum	California goosefoot	CHCA	NP
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	NP
Chorizanthe diffusa	diffuse spineflower	CHDI	NF
Chorizanthe douglasii	Douglas's spineflower	CHDO	NF
Chorizanthe pungens var. *pungens**	Monterey spineflower	CHPUP	NF

Scientific Name	Common Name	Code	Category
Cirsium occidentale	cobwebby thistle	CIOC	NP
Cirsium occidentale var. *candidissimum*	snowy thistle	CIOCC	NP
Cirsium sp.	thistle	CI	
Cirsium vulgare	bull thistle	CIVU	NNP
Cistus incanus	rock-rose	CIIN	NNP
Clarkia lewisii	Lewis' clarkia	CLLE	NF
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	NF
Clarkia sp.	clarkia	CL	NF
Clarkia unguiculata	elegant clarkia	CLUN	NF
Claytonia parviflora	narrow leaved miner's lettuce	CLPA	NF
Claytonia perfoliata	miner's lettuce	CLPE	NF
Clinopodium douglasii	yerba buena	CLDO	NP
Collinsia heterophylla var. *heterophylla*	Chinese-houses	COHEH	NF
Conicosia pugioniformis	narrowleaf iceplant	COPU	NNP
Conium maculatum	poison hemlock	COMA	NNP
Cordylanthus rigidus ssp. *littoralis**	seaside bird's-beak	CORIL	NF
Corethrogyne filaginifolia	common sandaster	COFI	NP
Cortaderia jubata	jubata grass	COJU	NNP
Crassula aquatica	water pygmy-weed	CRAQ	NF
Crassula connata	pygmy-weed	CRCO	NF
Crassula tillaea	moss pygmy-weed	CRTI	NNF
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Croton californicus	California croton	CRCA	NP
Cryptantha clevelandii	Cleveland's cryptantha	CRCL	NF
Cryptantha intermedia	common cryptantha	CRIN	NF
Cryptantha intermedia var. *intermedia*	common cryptantha	CRINI	NF
Cryptantha micromeres	minute-flowered cryptantha	CRMI	NF
Cryptantha sp.	cryptantha	CR	NF
Cyperus eragrostis	tall cyperus	CYER	NP
Danthonia californica	California oat grass	DACA	NP
Daucus pusillus	wild carrot	DAPU	NF
Deinandra corymbosa	coastal tarweed	DECO	NF
Delphinium hutchinsoniae	Hutchinson's larkspur	DEHU	NP
Dichelostemma capitatum	blue dicks	DICA	NP
Diplacus aurantiacus	sticky monkeyflower	DIAU	NP
Distichlis spicata	salt grass	DISP	NP
Dittrichia graveolens	stinkwort	DIGR3	NNF
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	NP
Dudleya farinosa	bluff lettuce	DUFA	NP
Elatine californica	California waterwort	ELCA	NF
Eleocharis acicularis	needle spikerush	ELAC	NP
Eleocharis macrostachya	spike rush	ELMA	NP

Scientific Name	Common Name	Code	Category
Elymus condensatus	giant wild-rye	ELCO	NP
Elymus glaucus	blue wild-rye	ELGL	NP
Elymus triticoides	beardless wild rye	ELTR	NP
Epilobium ciliatum	fringed willowherb	EPCI	NF
Eriastrum virgatum	virgate eriastrum	ERVI	NF
Ericameria ericoides	mock heather	ERER	NP
*Ericameria fasciculata**	Eastwood's goldenbush	ERFA	NP
Erigeron canadensis	horseweed	ERCA	NF
Eriodictyon californicum	yerba santa	ERCA6	NP
Eriogonum nudum	naked buckwheat	ERNU	NP
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium botrys	long-beaked filaree	ERBO	NNF
Erodium cicutarium	red-stemmed filaree	ERCI	NNF
*Erysimum ammophilum**	coast wallflower	ERAM	NP
Eschscholzia californica	California poppy	ESCA	NF
Eurybia radulina	roughleaf aster	EURA	NP
Euthamia occidentalis	western goldenrod	EUOC	NP
Festuca bromoides	brome fescue	FEBR	NNF
Festuca myuros	rattail sixweeks grass	FEMY	NNF
Festuca octoflora	sixweeks grass	FEOC	NF
Festuca perennis	Italian rye grass	FEPE	NNF
Frangula californica	California coffeeberry	FRCA	NP
Fritillaria affinis	checker lily	FRAF2	NF
Galium andrewsii	phlox-leaved bedstraw	GAAN	NP
Galium angustifolium	narrowly leaved bedstraw	GAAN2	NP
Galium aparine	goose grass	GAAP	NF
Galium californicum	California bedstraw	GACA	NP
Galium porrigens	climbing bedstraw	GAPO	NF
Galium porrigens var. *porrigens*	climbing bedstraw	GAPOP	NP
Gallium nuttallii	climbing bedstraw	GANU	NP
Gamochaeta ustulata	purple cudweed	GAUS	NP
Garrya elliptica	coast silk tassel	GAEL	NP
Gastridium phleoides	nit grass	GAPH	NNF
Genista monspessulana	French broom	GEMO	NNP
Geranium dissectum	cut-leaved geranium	GEDI	NNF
Gilia tenuiflora ssp. *arenaria**	sand gilia	GITEA	NF
Githopsis specularioides	common bluecup	GISP	NF
Gnaphalium palustre	lowland cudweed	GNPA	NF
Heliotropium curassavicum var. *oculatum*	seaside heliotrope	HECUO	NP
Hesperocyparis macrocarpa	Monterey cypress	HEMA22	NP
Heteromeles arbutifolia	toyon	HEAR	NP
Heterotheca grandiflora	telegraph weed	HEGR	NF

Scientific Name	Common Name	Code	Category
Hordeum brachyantherum	meadow barley	HOBR	NP
Hordeum sp.	sterile barley	HO	NNF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Horkelia cuneata var. *cuneata*	wedge-leaved horkelia	HOCUC	NP
Hypochaeris glabra	smooth cat's ear	HYGL	NNF
Hypochaeris radicata	rough cat's ear	HYRA	NNP
Isocoma menziesii var. *vernonioides*	Menzies' goldenbush	ISMEV	NP
Isoetes howellii	Howell's quillwort	ISHO	NF
Juncus balticus ssp. *ater*	baltic rush	JUBAA	NP
Juncus bufonius	toad rush	JUBU	NF
Juncus bufonius var. *bufonius*	common toad rush	JUBUB	NF
Juncus bufonius var. *congestus*	clustered toad rush	JUBUC2	NF
Juncus bufonius var. *occidentalis*	western toad rush	JUBUO	NP
Juncus capitatus	Dwarf rush	JUCA	NNF
Juncus occidentalis	western rush	JUOC	NP
Juncus patens	spreading rush	JUPA	NP
Juncus phaeocephalus	brown-headed rush	JUPH	NP
Juncus sp.	rush	JU	
Koeleria macrantha	june grass	KOMA	NP
Lastarriaea coriacea	leather spineflower	LACO	NF
Lasthenia glaberrima	smooth goldfields	LAGL3	NF
Lasthenia gracilis	common goldfields	LAGR	NF
Lathyrus angulatus	angled pea vine	LAAN	NNP
Layia platyglossa	tidy-tips	LAPL	NF
Lepechinia calycina	pitcher sage	LECA	NP
Lessingia pectinata	common lessingia	LEPE	NF
Logfia filaginoides	California cottonrose	LOFI	NF
Logfia gallica	daggerleaf cottonrose	LOGA	NNF
Logfia sp.	cottonrose	LO	
Lomatium parvifolium	coastal biscuitroot	LOPA	NP
Lupinus arboreus	yellow bush lupine	LUAR	NP
Lupinus bicolor	miniature lupine	LUBI	NF
Lupinus chamissonis/albifrons	silver bush lupine	LUCH/LUAL	NP
Lupinus concinnus	bajada lupine	LUCO	NF
Lupinus nanus	sky lupine	LUNA	NF
Lupinus truncatus	Nuttall's annual lupine	LUTR	NF
Luzula comosa var. *comosa*	Pacific wood rush	LUCOC	NP
Lysimachia arvensis	scarlet pimpernel	LYAR	NNF
Lysimachia minima	chaffweed	LYMI	NF
Lysimachia monelli	flaxleaf pimpernel	LYMO	NNP
Lythrum hyssopifolia	grass poly	LYHY	NNF
Madia elegans	common madia	MAEL	NF

Scientific Name	Common Name	Code	Category
Madia exigua	little tarweed	MAEX	NF
Madia gracilis	slender tarweed	MAGR	NF
Madia sativa	coast tarweed	MASA	NF
Madia sp.	tarweed	MA	NF
Marah fabacea	wild cucumber	MAFA	NP
Matricaria discoidea	pineapple weed	MADI6	NF
Medicago polymorpha	California burclover	MEPO	NNF
Medicago sativa	alfalfa	MESA	NNP
Melica imperfecta	coast range melic	MEIM	NP
Melica sp.	melic	ME	NP
Melica torreyana	Torrey's melic	METO	NP
Melilotus albus	white sweetclover	MEAL	NNF
Melilotus indicus	yellow sweetclover	MEIN	NNF
Microseris paludosa	Marsh microseris	MIPA	NP
Minuartia californica	sandwort	MICA	NF
Monardella sinuata ssp. *nigrescens*	curly-leaved monardella	MOSIN	NF
Morella californica	wax myrtle	MOCA6	NP
Navarretia atractyloides	Holly-leaf navarretia	NAAT	NF
Navarretia hamata	hooked navarretia	NAHA	NF
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP	NF
Navarretia mellita	skunk navarretia	NAME	NF
Navarretia sp.	navarretia	NA	NF
Navarretia squarrosa	skunkweed	NASQ	NF
Nemophila menziesii	baby blue eyes	NEME	NF
Nuttallanthus texanus	blue toadflax	NUTE	NF
Orobanche californica ssp. *californica*	broomrape	ORCAC	NP
Pennisetum clandestinum	Kikuyu grass	PECL	NNP
Pentagramma triangularis	gold back fern	PETR	NP
Persicaria lapathifolia	willow weed	PELA	NF
Petrorhagia dubia	hairypink	PEDU	NNF
Petrorhagia prolifera	pink grass	PEPR	NNF
Phacelia douglasii	Douglas phacelia	PHDO	NF
Phacelia malvifolia	stinging phacelia	PHMA	NF
Phalaris lemmonii	Lemmon's cannarygrass	PHLE	NF
Phalaris sp.	canary grass	PH	
Pinus radiata	Monterey pine	PIRA	NP
Piperia michaelii	Michael's rein orchid	PIMI6	NP
Piperia sp.	rein orchid	PI	NP
Plagiobothrys chorisianus var. *hickmanii*	Hickman's popcornflower	PLCHH	NF
Plagiobothrys sp.	popcorn flower	PL	NF
Plantago coronopus	cut-leaved plantain	PLCO	NNF
Plantago erecta	California plantain	PLER	NF

Scientific Name	Common Name	Code	Category
Plantago lanceolata	English plantain	PLLA	NNF
Plantago major	common plantain	PLMA	NNP
Platystemon californicus	cream cups	PLCA	NF
Poa pratensis	Kentucky bluegrass	POPR	NNP
Poaceae sp.	Unknown grass	PO	
Polycarpon tetraphyllum var. *tetraphyllum*	four-leaved allseed	POTET	NNF
Polygala californica	California milkwort	POCA	NP
Polypogon monspeliensis	rabbitsfoot grass	POMO	NNF
Populus trichocarpa	black cottonwood	POTR	NP
Prunus sp.	unknown cherry	PR	
Pseudognaphalium beneolens	fragrant everlasting	PSBE	NP
Pseudognaphalium californicum	California everlasting	PSCA	NP
Pseudognaphalium luteoalbum	weedy cudweed	PSLU	NNF
Pseudognaphalium ramosissimum	pink everlasting	PSRA	NP
Pseudognaphalium sp.	cudweed	PS	
Pseudognaphalium stramineum	cotton-batting plant	PSST	NP
Psilocarphus tenellus	slender woolly-marbles	PSTE	NF
Pteridium aquilinum var. *pubescens*	western bracken fern	PTAQP	NP
Pterostegia drymarioides	woodland threadstem	PTDR	NF
Quercus agrifolia	coast live oak	QUAG	NP
Ranunculus californicus var. *californicus*	common buttercup	RACAC	NP
Ribes malvaceum	chaparral currant	RIMA	NP
Ribes speciosum	fuchsia-flowered gooseberry	RISP	NP
Rubus ursinus	California blackberry	RUUR	NP
Rumex acetosella	sheep sorrel	RUAC	NNP
Rumex crassus	willow leaved dock	RUCR4	NP
Rumex crispus	curly dock	RUCR	NNP
Rumex salicifolius	willow leaved dock	RUSA	NP
Rumex sp.	dock	RU	
Sagina decumbens ssp. *occidentalis*	Western pearlwort	SADEO	NF
Salix laevigata	red willow	SALA3	NP
Salix lasiolepis	arroyo willow	SALA6	NP
Salix sp.	willow	SA	NP
Salvia mellifera	black sage	SAME	NP
Sanicula crassicaulis	Pacific sanicle	SACR	NP
Sanicula laciniata	coast sanicle	SALA7	NP
Schismus barbatus	old han schismus	SCBA	NNF
Senecio glomeratus	cutleaf burnweed	SEGL	NNF
Senecio sylvaticus	woodland groundsel	SESY	NNF
Senecio vulgaris	common groundsel	SEVU	NNF
Silene gallica	small-flower catchfly	SIGA	NNF
Sisyrinchium bellum	western blue-eyed grass	SIBE	NP

Scientific Name	Common Name	Code	Category
Solanum umbelliferum	blue witch	SOUM	NP
Solidago velutina ssp. *californica*	California goldenrod	SOVEC	NP
Sonchus asper	prickly sow thistle	SOAS	NNF
Sonchus oleraceus	common sow thistle	SOOL	NNF
Sonchus sp.	sow thistle	SO	NNF
Spergula arvensis	corn spurry	SPAR	NNF
Spergularia rubra	red sand-spurrey	SPRU	NNF
Spergularia villosa	hairy sand-spurrey	SPVI	NNP
Stachys ajugoides	bugle hedge-nettle	STAJ	NP
Stachys bullata	wood mint	STBU	NP
Stipa cernua	nodding needle grass	STCE	NP
Stipa pulchra	purple needle grass	STPU	NP
Stipa sp.	needle grass	ST	NP
Stylocline gnaphaloides	everlasting neststraw	STGN	NF
Symphoricarpos albus var. *laevigatus*	common snowberry	SYALL	NP
Taraxia ovata	sun cup	TAOV	NP
Thysanocarpus laciniatus	narrow leaved fringe pod	THLA	NF
Toxicodendron diversilobum	poison oak	TODI	NP
Toxicoscordion fremontii	Fremont's deathcamas	TOFR	NP
Tribolium obliterum	Capetown grass	TROB	NNF
Trifolium albopurpureum	rancheria clover	TRAL	NF
Trifolium angustifolium	narrow-leaved clover	TRAN	NNF
Trifolium campestre	hop clover	TRCA	NNF
Trifolium depauperatum var. *truncatum*	truncate sack clover	TRDET	NF
Trifolium dubium	little hop clover	TRDU	NNF
Trifolium gracilentum	pinpoint clover	TRGR	NF
Trifolium hirtum	rose clover	TRHI	NNF
Trifolium macraei	Macrae's clover	TRMA	NF
Trifolium microcephalum	small-head clover	TRMI	NF
Trifolium sp.	clover	TR	
Trifolium willdenovii	tomcat clover	TRWI	NF
Triglochin scilloides	flowering-quillwort	TRSC	NF
Triphysaria pusilla	dwarf owl's clover	TRPU	NF
Triteleia ixioides	pretty face	TRIX	NP
Triteleia sp.	Triteleia	TRI	
Uropappus lindleyi	silver puffs	URLI	NF
Verbena bracteata	bracted verbena	VEBR	NP
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL	NP
Vicia americana ssp. *americana*	American vetch	VIAMA	NP
Vicia benghalensis	purple vetch	VIBE	NNF
Vicia hassei	slender vetch	VIHA	NF
Vicia ludoviciana ssp. *ludoviciana*	slender vetch	VILUL	NF

Scientific Name	Common Name	Code	Category
Vicia sativa	spring vetch	VISA	NNF
Vicia sativa ssp. *nigra*	narrow-leaved vetch	VISAN	NNF
Vicia sativa ssp. *sativa*	spring vetch	VISAS	NNF
Vicia sp.	vetch	VI	
Xanthium strumarium	rough cockleburr	XAST	NF
Zeltnera davyi	Davy's centaury	ZEDA	NF
	bare ground	BG	BG
	thatch	TH	TH

* HMP species
NP = Native Perennial (Shrubs and Perennial Herbs/Forbs)
NF = Native Forb (Annual Herbs/Forbs
NNP = Non-Native Perennial
NNF = Non-Native Forb

1. INTRODUCTION

Burleson Consulting Inc., A Terracon Company (Burleson) was issued ID/IQ Contract Number W91238-18-D-0007 by the US Army Corps of Engineers (USACE) to continue habitat restoration at Site 39 Remedial Action Areas at former Fort Ord, Monterey, California. This annual report summarizes habitat restoration completed from December 2021 through February 3, 2023, a progress summary for each Historic Area (HA), and the likelihood if the HA will meet its success criteria by monitoring year 13.

1.1 Purpose

Former military ranges underwent soil remediation and subsequent habitat restoration in areas that ranged in size from 0.05 to 14 acres and were scattered around the perimeter of the Site 39 Inland Ranges area (Site 39) of former Fort Ord. Approximately 62 acres of soil remediation area needed restoration at HAs 18, 19, 22, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 38, 39/40, 43, 44, 48, and Austin Road Stockpile. Burleson's objective was to provide seed/plant material collection, propagation, planting, and minor erosion control repairs necessary to restore the area to the requirements of the *Site 39 Habitat Restoration Plan* (HRP) (Shaw, 2009b). The restoration areas contain primarily rare central maritime chaparral habitat with smaller inclusions of coastal sage scrub, oak woodland, grassland, and vernal pool habitats.

Burleson developed Site Specific Restoration Plans (SSRP) for HAs 18, 19, 22, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 38, 39/40, 43, 44, 48, and Austin Road Stockpile which provide detailed information (site conditions, baseline vegetation, targets, and collection/propagation requirements) for each HA (Burleson, 2013). In 2010, Burleson prepared the *Plant Material, Collection, Storage, and Propagation Protocols for Site Restoration at Site 39* (Propagation Protocol) (Burleson, 2010). These documents provide necessary information and guidance to conduct restoration activities at Site 39. This annual report details tasks involved with the execution of habitat restoration on Site 39 in 2022 and early 2023, a progress summary for each HA, and recommendations when altered restoration or monitoring tactics are required.

Work performed in 2022 and early 2023 consisted of:

- Storage of previously collected plant material
- Propagating collected plant material
- Restoration activities at HAs 18, 22, 23, 26, 27, 27A, 34, 36, 37, and 43
- Erosion control repairs at HAs 27A, 29, 34, 36, and 37
- Monitoring restoration sites to evaluate vegetative establishment
- Final irrigation event at HA 26 and dismantling of irrigation system

1.2 General Site Conditions

Site 39 is dominated by maritime chaparral; a regionally rare, fire-dependent plant community found within the coastal fog zone on sandy to rocky soils. Chaparral habitats are dominated by drought-deciduous or evergreen sclerophyllous shrubs. This unique species-rich plant community changes in species composition from the western edges of Site 39, which are frequently foggy and cool, to the eastern edges which are less foggy, warmer, and drier.

1.3 Site 39 Restoration Progress

Site Specific Restoration Plans were developed for 18 HAs and one stockpile area requiring habitat restoration for 61.71 acres. The 19 SSRPs prescribed passive restoration (seeding) for 61.71 acres and active restoration (planting) for 29.84 acres. Active restoration requires installation of approximately 52,000 plants. Figure 1-1 presents the status of restoration sites within Site 39.

Both active and passive restoration activities began in 2011. Passive restoration activities are ongoing while active restoration activites were complete as of February 3, 2023. Approximately 61.26 acres were seeded (passive restoration) and 68,732 plants were installed (active restoration) since 2011. Of the 19 restoration sites, 18 received their full SSRP restoration prescription and are in a monitoring phase (see Figure 1-1). Austin Road Stockpile is the only site that is not complete and has not received any restoration to date.

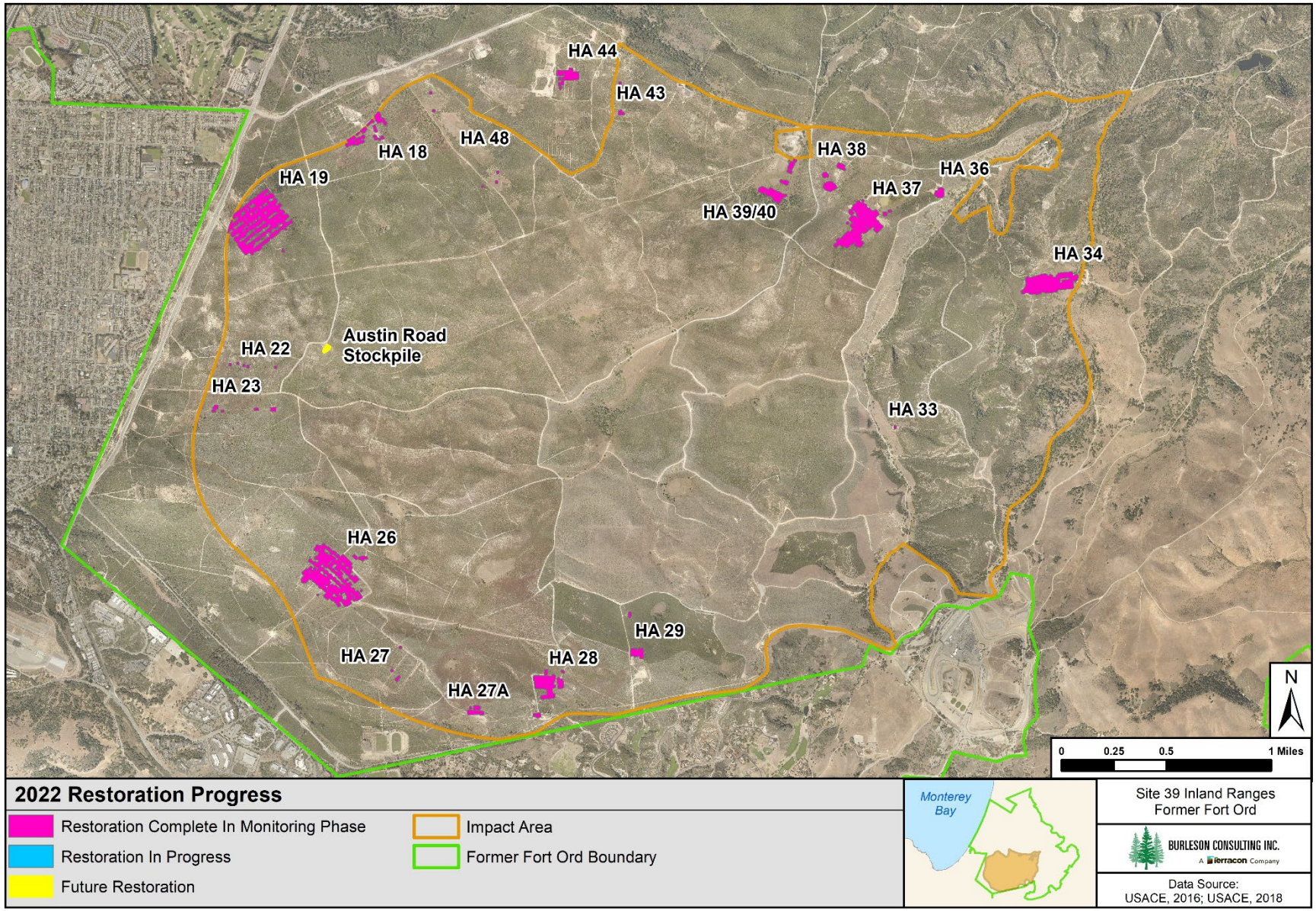

Figure 1-1. Restoration Progress Map

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2. RESTORATION PROTOCOLS AND SITE-SPECIFIC RESTORATION PLANS

The protocols developed by Burleson detail quantities, types of plant material to be collected, and specific salvage and propagation techniques to be followed by field crews for former Fort Ord (Burleson, 2010; Burleson, 2013). Additionally, S&S Seed, a native seed company, supports Burleson with seed production, which will be discussed further in Section 3.1.

In accordance with the protocol (Burleson, 2010), field crews collect Habitat Management Plan (HMP) species within a 1-kilometer radius centered on each HA. Common species are collected within a 10-mile radius of each HA. Collected seeds are processed manually to remove residual hulls, stems, leaves, and chaff, as much as possible. Seed weight totals are entered into the plant inventory database after seed processing is completed.

The plant material collected is dried and processed at Burleson's native plant nursery in Carmel Valley. The plant material is stored at Burleson's Monterey office in a cool, dry environment until ready to be broadcast. Labeling and tracking of all plant material follows the storage protocol (Burleson, 2010). Burleson maintains a spreadsheet database that is regularly updated so that plant and seed inventories are readily available. The database contains the following information:

- Scientific name and common name
- Container size (if applicable)
- Quantity (in nursery)
- Quantity (delivered)
- Seed/cutting origin
- Client
- Batch name and date sown
- Experimental treatments used during propagation (when applicable)

2.1 Burleson Carmel Valley Native Plant Nursery

Burleson continued to implement Best Management Practices (BMP) recommended by the California Department of Food and Agriculture (CDFA) and Monterey County Agricultural Commission at Burleson's Carmel Valley native plant nursery to prevent the spread of plant pathogens – especially *Phytophthora*. BMPs included limiting points of entry, foot baths at critical access points, mandatory use of new plant containers, sanitation of tools and off-site cuttings, designated areas for soil storage, and raised platforms to keep plants off the ground. If plants show symptoms of pathogens, they are separated from healthy plants by a minimum of 10 feet and treated. If necessary, infected plants are removed from the nursery completely and taken to the landfill.

A pear test is an initial indicator for pathogens and is used before sending samples for a laboratory test. Pear tests are performed on suspect plants by placing a pristine pear in a container with wet soil from the suspected plant's container. The pear will blacken or develop lesions if a pathogen is present (Bernhardt and Swiecki, 2019). Plants from the same propagation date as those undergoing pear tests, and other surrounding plants potentially in danger of being splashed during watering, are quarantined regardless of exhibiting symptoms. Burleson conducted pear tests in March, June, September, and December of 2022 and found negative results for *Phytophthora*. If the plants were found to be positive, they would have been sent to a CDFA laboratory for further testing and identification of *Phytophthora* species. Photographs C-1 through C-4 in Appendix C illustrate pear test results.

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3. SEED COLLECTION

In 2022, 0.80 acres-worth of seed was collected for HA 34 (see Table A-1, Appendix A). An acre-worth of seed is defined as the amount of seed, as prescribed by each SSRP, to restore one acre at a specific restoration site. All common and HMP species were collected in accordance with the Propagation Protocol (Burleson, 2010). All seed collection target goals were met for 2022. Photographs C-5 through C-14 in Appendix C show seed collection activities.

3.1 Seed Production

In addition to on-site seed collection, Burleson contracted S&S Seeds to grow former Fort Ord-specific bulk seed for purple needlegrass (*Stipa pulchra*) and deerweed (*Acmispon glaber*). In January 2022, we were informed by S&S Seeds that the deerweed plot did not survive. The plot did not respond to watering after the precipitation received in December 2021 and was consequently plowed. The 2022 production seed yield of purple needlegrass is presented in Table 3-1. The total production seed inventory can be found in Table A-2 in Appendix A. Photographs C-15 and C-16 in Appendix C show production seed plots.

Table 3-1. 2022 Production Plot Seed Yield

Species	Bulk Seed (lb)	Pure Live Seed (lb)
Stipa pulchra **(purple needlegrass)**	201.6	163.4

Bulk seed contains seed, inert matter, and other crop material. Pure Live Seed, a measure of seed quality, is the quantity in pounds (lb) of viable seed within the bulk seed and is calculated by multiplying bulk seed times the purity from a germination test. Seed test results for production species are presented in Table A-3, Appendix A. The purple needlegrass plot will be continued in 2023.

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4. PLANT PROPAGATION

Plant propagation activities occurred at the Burleson native plant nursery in Carmel Valley, California. Propagation activities were conducted in accordance with the Propagation Protocol for 19 common and HMP species used in active restoration (Burleson, 2010). The 2022 SSRP plant quantity targets totaling 1,296 plants were achieved for HA 34. The 2022 Adaptive Management Plan (AMP) plant quantity targets totaling 325 plants were achieved for HAs 18, 22, 23, 27, and 36.

See Tables A-4 and A-5 in Appendix A for final plant inventories for HAs 18, 22, 23, 27, 34, and 36. Photographs C-17 through C-24 in Appendix C illustrate various aspects of plant propagation.

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5. RESTORATION ACTIVITIES

The objective of restoration activities is to return impacted areas to a natural landscape that resembles adjacent habitat communities in accordance with each SSRP. Restoration activities completed in 2022 and early 2023 included passive restoration at HA 34 and active restoration at HAs 18, 22, 23, 26, 27, 27A, 34, 36, 37, and 43.

5.1 Passive Restoration

Generally, passive restoration activities occur annually between October and February, spanning two calendar years. Only HA 34 received passive restoration during the 2022 calendar year.

5.1.1 HA 34 Passive Restoration Activities

In November 2022, Burleson applied 0.8 acre-worth of SSRP seed mix, enhanced with production seed mix, over 0.8 acres at HA 34 (see Appendix B Figure B-3, Table B-6). Photographs C-25 through C-28, Appendix C show passive restoration efforts at HA 34.

5.2 Active Restoration

Table 5-1 summarizes active restoration activities at each site. In late 2021 and early 2022, Burleson completed SSRP and AMP planting activities at HAs 18, 26, 27, 27A, 34, 36, 37, and 43 and installed a total of 3,684 plants. Site Specific Restoration Plan planting activities occurred at HAs 26, 34, and 37 with a total of 3,409 plants installed. Adaptive Management Plan planting activities occurred at HAs 18, 27, 27A, 36, and 43 with a total of 275 plants installed to supplement sites that did not meet success criteria in 2020.

In late 2022 and early 2023, Burleson completed SSRP and AMP planting activities at HAs 18, 22, 23, 27, 34, and 36 and installed a total of 1,985 plants. Site Specific Restoration Plan planting activities occurred at HA 34 with a total of 1,606 plants. Adaptive Management Plan activities occurred at HAs 18, 22, 23, 27, and 36 with a total of 379 plants to supplement sites that did not meet success criteria in 2020. Tables B-11 through B-22 in Appendix B provide detailed information on the species and quantities planted at each HA. Photographs C-29 through C-34, Appendix C show active restoration efforts.

Table 5-1. 2022 Summary of Active Restoration Activities per Historic Area

HA	Active Restoration Activities
18	Installed 25 plants (Feb 2022); installed 100 plants (Dec 2022)
22	Installed 80 plants (Dec 2022)
23	Installed 60 plants (Jan 2023)
26	Installed 1,741 plants throughout Target Areas 1, 2, and 3 (Dec 2021)
27	Installed 25 plants (Feb 2022); installed 20 plants (Jan 2023)
27A	Installed 25 plants (Jan 2022)
34	Installed 1,278 plants throughout Sub-Areas 1, 2, 3, and 6 (Jan 2022); installed 1,306 plants throughout Sub-Areas 1 and 2A (Dec 2022); installed 300 plants throughout Sub-Areas 1 and 7 (February 2023)
36	Installed 125 plants (Jan 2022); installed 119 plants (Jan 2023)
37	Installed 390 plants throughout Sub-Areas 1 and 2 (Feb 2022)
43	Installed 75 plants (Feb 2022)

5.2.1 HA 18 Active Restoration Activities

In February 2022, Burleson installed 25 dwarf ceanothus (*Ceanothus dentatus*) individuals throughout HA 18 because the site was not meeting the species richness success criterion when last monitored in 2020 (Burleson, 2021). In December 2022, Burleson installed 100 Monterey ceanothus (*Ceanothus rigidus*) individuals due to the site not meeting the HMP shrub cover by species success criterion. Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided. Figure B-6 in Appendix B shows the location of planted areas and Table B-11 lists installed species and quantities.

5.2.2 HA 22 Active Restoration Activities

In December 2022, Burleson installed 20 sandmat manzanita (*Arctostaphylos pumila*), 20 Monterey ceanothus, and 40 Eastwood's goldenbush (*Ericameria fasciculata*) individuals throughout HA 22 because the site was not meeting the HMP shrub cover by species success criterion when last monitored in 2020 (Burleson, 2021). Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided. Figure B-7 in Appendix B shows the location of planted areas and Table B-12 lists installed species and quantities.

5.2.3 HA 23 Active Restoration Activities

In January 2023, Burleson installed 20 Monterey ceanothus and 40 Eastwood's goldenbush individuals throughout HA 23 because the site was not meeting the HMP shrub cover by species success criterion when last monitored in 2020 (Burleson, 2021). Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided. Figure B-8 in Appendix B shows the location of planted areas and Table B-13 lists installed species and quantities.

5.2.4 HA 26 Active Restoration Activities

From December 2021 to January 2022, Burleson installed 1,741 plants in three Target Areas at HA 26 as part of the SSRP prescription. In Target Area 1 (1.6 acres), 553 plants were installed. In Target Area 2 (2.5 acres), 869 plants were installed. In Target Area 3 (0.8 acres), 319 plants were installed. A portion of the site was covered in mulch in 2017 for erosion control measures and large plants with bigger roots were installed in those areas to increase survivorship. Additionally, barren areas were planted more densely than areas with good natural recruitment. Figure B-9 in Appendix B shows the location of planted areas and Table B-14 lists installed species and quantities.

5.2.5 HA 27 Active Restoration Activities

In February 2022, Burleson installed 25 sandmat manzanita individuals throughout HA 27 because the site was not meeting the HMP shrub cover by species success criterion when last monitored in 2020 (Burleson, 2021). Burleson installed an additional 20 sandmat manzanita in January 2023. Figure B-10 in Appendix B shows the location of planted areas and Table B-15 lists installed species and quantities.

5.2.6 HA 27A Active Restoration Activities

Burleson installed 25 Monterey manzanita (*Arctostaphylos montereyensis*) individuals evenly throughout HA 27A North in January 2022, because the site was not meeting the HMP shrub cover by species success criterion when last monitored in 2020 (Burleson, 2021). Figure B-11 in Appendix B shows the location of planted areas and Table B-16 lists installed species and quantities.

5.2.7 HA 34 Active Restoration Activities

Burleson installed a total of 1,278 plants at HA 34 in January 2022, as part of the SSRP prescription. The plants were installed over 2.8 acres at the top (west) and middle area of the site. Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided.

In December 2022 Burleson installed 1,306 plants over 1.25 acres at HA 34 as part of the SSRP. In February 2023 an additional surplus 300 plants were installed over 1.1 acres. Figure B-12 in Appendix B shows the location of planted areas and Tables B-17 through B-19 list installed species and quantities. Photographs C-32 through C-34 in Appendix C demonstrate plant installation at HA 34.

5.2.8 HA 36 Active Restoration Activities

In January 2022, Burleson installed 50 sandmat manzanita and 75 Eastwood's goldenbush individuals throughout HA 36 because the site was not meeting the HMP shrub cover by species success criterion when last monitored in 2020 (Burleson, 2021). An additional 59 Monterey manzanita and 60 Monterey ceanothus plants were installed in January 2023. Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided. Figure B-13 in Appendix B shows the location of planted areas and Table B-20 lists installed species and quantities at the site. Photographs C-29 and C-30 in Appendix C show planting efforts at HA 36.

5.2.9 HA 37 Active Restoration Activities

Burleson installed 390 plants over 1.4 acres at HA 37 in February 2022 to fulfill SSRP planting prescriptions. The plants were installed in two distinct areas on the eastern and western parts of the site. Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided. Figure B-14 in Appendix B shows the location of planted areas and Table B-21 lists installed species and quantities.

5.2.10 HA 43 Active Restoration Activities

In February 2022, Burleson installed 75 Eastwood's goldenbush plants throughout HA 43, excluding HMP annual restoration plots, because the site was not meeting the HMP shrub cover by species success criterion when last monitored in 2020 (Burleson, 2021). Plants were installed evenly throughout barren areas; areas with dense vegetation were avoided. Figure B-15 in Appendix B shows the location of planted areas and Table B-22 lists installed species and quantities at the site. Photograph C-31 in Appendix C shows planting efforts at HA 43.

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6. MONITORING

Burleson conducted photo point documentation, HMP annual density, species richness, vegetative cover, and plant survivorship surveys at relevant HAs in 2022. Monitoring activities were guided by the HRP and the *Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Management Plan at Former Fort Ord* (Monitoring Protocol) (Shaw, 2009b; Burleson, 2009a). Monitoring activities conducted in 2022 are summarized in Table 6-1 by HA. Section 6.1 describes monitoring methodology. Monitoring results for 2022 are presented in Section 9 on a site-by-site basis. Photographs C-35 through C-40 in Appendix C illustrate various monitoring tasks.

Table 6-1. 2022 Summary of Monitoring Activities by HA

HA	Photo Point	HMP Annual Density	Species Richness	Vegetative Cover	Plant Survivorship
18	●				
19	●	●			
22	●				
23	●				
26	●				●
27	●				
27A	●				
28	●	●	●	●	
29	●				
33	●				
34	●		●	●	●
36	●				
37	●	●	●	●	●
38	●	●	●	●	
39/40	●				
43	●	●			
44	●		●	●	
48	●				
Austin Rd. Stockpile	●	●	●		

Vegetative monitoring data, including species richness, vegetative cover, and HMP annual density, were compared to the success criteria associated with each objective outlined in the SSRPs (Burleson, 2013). Success criteria are summarized in Table 6-2.

Table 6-2. Success Criteria

Success Criterion	Category	Data Used for Comparison
Objective 1 – No. 1	Species richness	Meandering transect survey and 10-feet on either side of line-intercept transect
Objective 1 – No. 2	Native vegetation cover	Line-intercept transect percent cover
Objective 2 – No. 3	Non-native target weed cover	Line-intercept transect percent cover
Objective 3 – No. 4	HMP shrub cover	Line-intercept transect percent cover
Objective 3 – No. 4	HMP shrub cover by species	Line-intercept transect percent cover
Objective 3 – No. 4	HMP annual density	HMP annual plot density surveys and meandering transect survey to map discrete patches of HMP annuals outside of HMP annual restoration plots

6.1 Monitoring Methodology

6.1.1 Photo Points and Photo Documentation

Multiple permanent photo points were established at each restoration site to document progress. Photos were taken annually in the spring at every photo point and again in the fall at select photo points. Additionally, photo documentation of restoration activities occurred throughout the year. See Appendix C for a photo log of 2022 activities, Appendix D for photo point comparisons for all sites, Appendix E for photos illustrating restoration progress of HAs in year 5 of monitoring in 2022, and Appendix F for photos illustrating restoration progress of HAs in year 8 of monitoring in 2022.

6.1.2 HMP Annual Density Surveys at Restoration Plots and Across the Historic Area

Plot density surveys for HMP annuals (Monterey spineflower [*Chorizanthe pungens* var. *pungens*], sand gilia [*Gilia tenuiflora* ssp. *arenaria*], and seaside bird's beak [*Cordylanthus rigidus* ssp. *littoralis*]) are performed at restoration sites in years 1, 2, 3, 4, 5, and 8 during peak bloom for each species according to the HRP (Shaw, 2009b). HMP annual density was obtained by counting every individual within an HMP annual restoration plot and calculating the number of plants per 100 square feet. Density classes were derived from the HRP (see Table 6-3).

Table 6-3. HMP Annual Density Classes

Density Class	Plants Counted per 100 Square Feet
Not Present	0
Low	1-50
Medium	51-100
High	101-500
Very High	>500

Discrete patches of HMP annuals within the HA but outside of HMP annual restoration plots were mapped during meandering transect surveys using a Trimble® Juno® T41/5B Series GPS unit with an external Trimble® R1 GNSS receiver. Discrete patches were assigned a density class or population count dependent on feasibility. If the HMP annual occupied area was larger than one acre in size, density may

be obtained by sub-sampling the population with circle plot surveys as described in the Monitoring Protocol (Burleson, 2009a). There were no HMP annuals that occupied an area larger than one acre in size and therefore no circle plot surveys were conducted. HMP annual restoration plot and discrete patch densities were evaluated together to compare to the Objective 3 success criterion. For a given year, the combination of plots and discrete patches monitored that year were compared to baseline density requirements. The success criterion was met if plots and discrete patches combined indicated that the site maintained or exceeded baseline densities for each applicable HMP annual species. It was not necessary for HMP annuals to meet baseline density in all plots if discrete patches were present. At year 8, data for all monitoring years is evaluated together to determine whether the site met the success criterion.

The method used to measure HMP annual cover for Objective 3 was changed in 2017 from what was described in the SSRPs to a more appropriate evaluation method. Prior to 2017, the success criterion for monitoring HMP annuals required greater than or equal to 1% transect cover for Monterey spineflower, sand gilia, and/or seaside bird's beak. However, transects were designed to measure shrub and perennial plants with cover greater than 0.1 meters. HMP annual cover was underrepresented by transect surveys because patches of HMP annuals are often less than 0.1 meter across and have variable peak bloom time. In August 2017, the US Fish and Wildlife Service (USFWS) approved the abandonment of transect percent cover as a measure of HMP annual cover and the associated success criterion (USFWS, 2017). Instead of using transect surveys to assess HMP annuals, USFWS approved comparing HMP annual seeded plot densities and discrete patches to the success criterion as recommended in the 2016 Habitat Restoration Annual Report (Burleson, 2017).

6.1.3 Plant Survivorship Monitoring

Annual plant survivorship surveys are completed for three years after plant installation. A random sample of at least 10% of each shrub species were tagged and monitored annually. Survivorship monitoring events occurred in the fall at the end of the dry season when plant mortality rates were highest. During monitoring events, all tagged plants were counted as alive or dead to calculate survivorship percentages. All plants monitored were evergreens that should have live leaves year-round. Plants with live leaves were recorded as alive. Plants with no leaves or leaves that appeared dead were recorded as dead. Plant survivorship data are not compared to success criteria. Plant survivorship classifications are presented in Table 6-4.

Table 6-4. Plant Survivorship Classifications

Plant Survivorship	Percent Alive
High	80-100%
Moderate	50-79%
Low	≤49%

In reports preceding 2018, plants that were in poor condition or plants that were not found were considered dead. From 2018 onward, plant survivorship for all years was recalculated to consider plants that were in poor condition as alive, and plants that were not found were excluded from the percent alive calculation.

6.1.4 Vegetative Cover

Vegetative cover is monitored in years 1, 2, 3, 4, 5, 8, and 13 following restoration, typically from May to July. Prior to 2016, sites were visually assessed for cover. Beginning in 2016, cover of vegetation, thatch, and bare ground were measured using line-intercept transect surveys, as described in the Monitoring

Protocol (Burleson, 2009a). In 2016, HAs 22, 23, 27, 33, and 43 were surveyed using randomly placed quadrats to provide a preliminary idea of vegetative cover with a limited amount of effort. From 2017 onward, line-intercept transect surveys were completed for compatibility with SSRP objectives. Fifty-meter transects were placed randomly throughout each HA at a rate of one transect per acre; transects were not placed across roads or berms. For HAs that were less than 1 acre, shortened transects were placed diagonally through each plot. The corners of each plot were numbered 1-4 and the start point was determined using a random number generator. Quadrat sampling along transects was completed when annual herbaceous cover on the transect line was 10% or greater.

Vegetative cover was calculated to compare to the success criteria outlined in each SSRP. For all transects, the vegetative cover was calculated by summing the distance along the transect for each species and dividing by the length of the transect. Percent cover for all transects was then averaged to calculate average site cover by species, native shrubs and perennials, and other categories (Shaw, 2009b). To calculate the site average, the distance along transects was summed for each species and divided by the total transect length.

For each HA, native vegetative cover, non-native vegetative cover, total HMP shrub cover, and HMP shrub cover by species were evaluated against baseline objectives specified in the SSRPs. Results were compared to previous years to discern trends over time. Native vegetative cover was calculated by summing the percent cover of all species listed in Table 2 of the SSRPs for each site. The success criteria for native vegetative cover and HMP shrub cover were met if percent cover met or exceeded baseline percent cover (Objectives 1 and 3). For non-native vegetative cover, the success criterion was met if percent cover was less than the acceptable limit (Objective 2). In addition, the five species with the greatest percent cover for each HA were compared graphically across monitoring years.

At HAs 37, 38, 39/40, 44, and 48, silver bush lupine was identified as *Lupinus chamissonis* in Table 2 of the SSRPs. However, according to the Jepson Manual, Calflora, and *The Plants of Monterey County,* silver bush lupine is identified as *Lupinus albifrons* var. *albifrons* (Baldwin *et al.*, 2012; CalFlora, 2017; Matthews and Mitchell, 2015). Both species are present on Fort Ord and are difficult to identify unless flowers are present. Silver beach lupine (*Lupinus chamissonis*) can be differentiated from silver bush lupine (*Lupinus albifrons* var. *albifrons*) by the absence of hairs on the upper keel margin; silver bush lupine has hairs on the upper keel margin. For analysis of transect data and comparison to the success criteria, silver beach lupine and silver bush lupine data were combined.

6.1.5 Species Richness

A species list for each HA is developed by conducting meandering transects in years 1, 2, 3, 4, 5, 8, and 13 and by recording all species observed within 10 feet on either side of line-intercept transects, if applicable. Species richness was evaluated by comparing the quantities of native shrubs and perennials, native annual and herbaceous species, and non-native species observed to the quantities observed in previous years. The success criterion for species richness was met if all species listed in Table 3 of the SSRPs were present on site (Objective 1).

7. EROSION CONTROL ACTIVITIES

During the 2022 calendar year, Burleson conducted erosion control repairs at HAs 27A, 29, 34, 36, and 37. Production seed broadcast occurred in barren areas of each site and areas where HMP annual species were historically present outside of HMP restoration plots were avoided. Erosion control and production seed mix details can be found in Appendix B. Photographs C-41 through C-48 in Appendix C document erosion control field activities. The following work was performed in 2022:

HA 27A:

- February 2022
    - Collapsed approximately 100 linear feet of rill erosion averaging 6” wide by 12” deep
    - Installed 375 linear feet of straw wattles
    - Broadcast production seed mix over 0.1 acre
    - Broadcast erosion control seed mix over 0.1 acre
    - Broadcast and crimped straw mulch and 200 lbs. of Biosol on 0.4 acre

HA 29:

- February 2022
    - Broadcast production seed mix over 1.0 acre
    - Broadcast and crimped straw, native mulch, and 1,000 lbs. of Biosol on 3.0 acres

HA 34:

- March 2022
    - Collapsed approximately 200 linear feet of rill erosion averaging 6” wide by 6” deep
    - Monitored and maintained 750 linear feet of water bars
    - Broadcast production seed mix over 1.0 acre
    - Broadcast erosion control seed mix over 1.0 acre
    - Broadcast and crimped straw mulch on 1.0 acre
- December 2022
    - Installed 500 linear feet of straw wattles
    - Collapsed approximately 200 linear feet of rill erosion averaging 6” wide by 6” deep
    - Monitored and maintained 750 linear feet of water bars
    - Broadcast erosion control seed mix over 1.25 acres of former access road and along bare area on crest of hill/western edge of site
    - Broadcast and crimped straw mulch on 1.25 acres

HA 36:

- February 2022
    - Broadcast production seed mix over 0.2 acre
    - Broadcast and crimped straw mulch and 200 lbs. of Biosol on 0.4 acre

HA 37:

- February - April 2022
    - Collapsed approximately 365 linear feet of rill erosion averaging 6” wide by 6” deep
    - Installed 875 linear feet of straw wattle

  - Installed 80 linear feet of coconut fiber coir log
  - Installed 3,000 square feet of coir fabric
  - Broadcast production seed mix over 1.45 acres
  - Broadcast erosion control seed mix over 0.45 acre
  - Broadcast and crimped straw mulch on 0.7 acre
- August 2022
  - Adjusted coir fabric to ensure better contact with soil
  - Installed an additional 250 square feet of coir fabric

8. IRRIGATION

For the last three years, Burleson maintained and operated an irrigation system to water plants at HA 26. Burleson completed the final irrigation event at HA 26 in February 2022. Sala Brothers Water Trucking delivered 14,000 gallons of water to the tanks on site and Burleson irrigated approximately 3,500 plants with approximately four gallons of water each.

After the final irrigation event, the system was decommissioned. Polyvinyl chloride pipes, polyvinyl lines, spaghetti lines, emitters, stakes, and sandbags were all removed from the site. The water tanks remain on site for potential use during future burn program operations. Photographs C-49 through C-52 in Appendix C document the cleanup of the irrigation system. A summary of the irrigation system, challenges successes, analyses of plant survivorship data, and recommendations are included in Appendix G.

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9. RESTORATION SUMMARY AND MONITORING RESULTS BY HA

To understand restoration progress and discuss future efforts for each HA, it was important to compare the current status of each HA to its specific success criteria. Section 9 is an overview of all restoration efforts through December 2022, active restoration efforts through February 3, 2023, monitoring results, comparison to the success criteria, and recommendations for each HA.

9.1 HA 18

HA 18 was used by the US Department of the Army (Army) as a long-distance small-arms firing range that consisted of seven target lanes approximately 165 feet apart. Soil remediation was completed in 2010 and resulted in 2,750 cubic yards of lead-contaminated soil being excavated from 1.4 acres (Shaw, 2008). HA 18 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58°F (Fahrenheit) and regular fog typical of maritime climates (USFS, 2007). HA 18 is relatively flat with northwest and west aspects. Adjacent lands are high quality habitat with intact native vegetation that may promote natural recruitment within restoration areas.

HA 18 is located on the northwestern portion of Site 39, occurring within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 18 consisted of hand broadcast of a non-irrigated seed mix and annual weed management. HA 18 is relatively flat with little potential for erosion.

Restoration at HA 18 occurred in 2011, 2012, 2019, 2020, and 2022 and quantitative monitoring began in 2013. The HA was monitored for 12 years by photo documentation and site visits, seven years for HMP annual density in plots, and four years for HMP annual density across the HA, species richness, and vegetative cover (see Table 9-1). Figure 9-1 shows the passive restoration area, photo documentation locations, and transect monitoring locations. Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Success criteria for HA 18 are summarized in Table 9-2.

Table 9-1. Historic Summary of Restoration and Monitoring Activities at HA 18

Activity	Monitoring Years												
			1	2	3	4	5	6	7	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025
Restoration: Active, Passive, and Erosion Control	●	●							●	●		●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●		●			
HMP Annual Density across HA						●	●	●		●			
Species Richness						●	●	●		●			●
Vegetative Cover						●	●	●		●			●

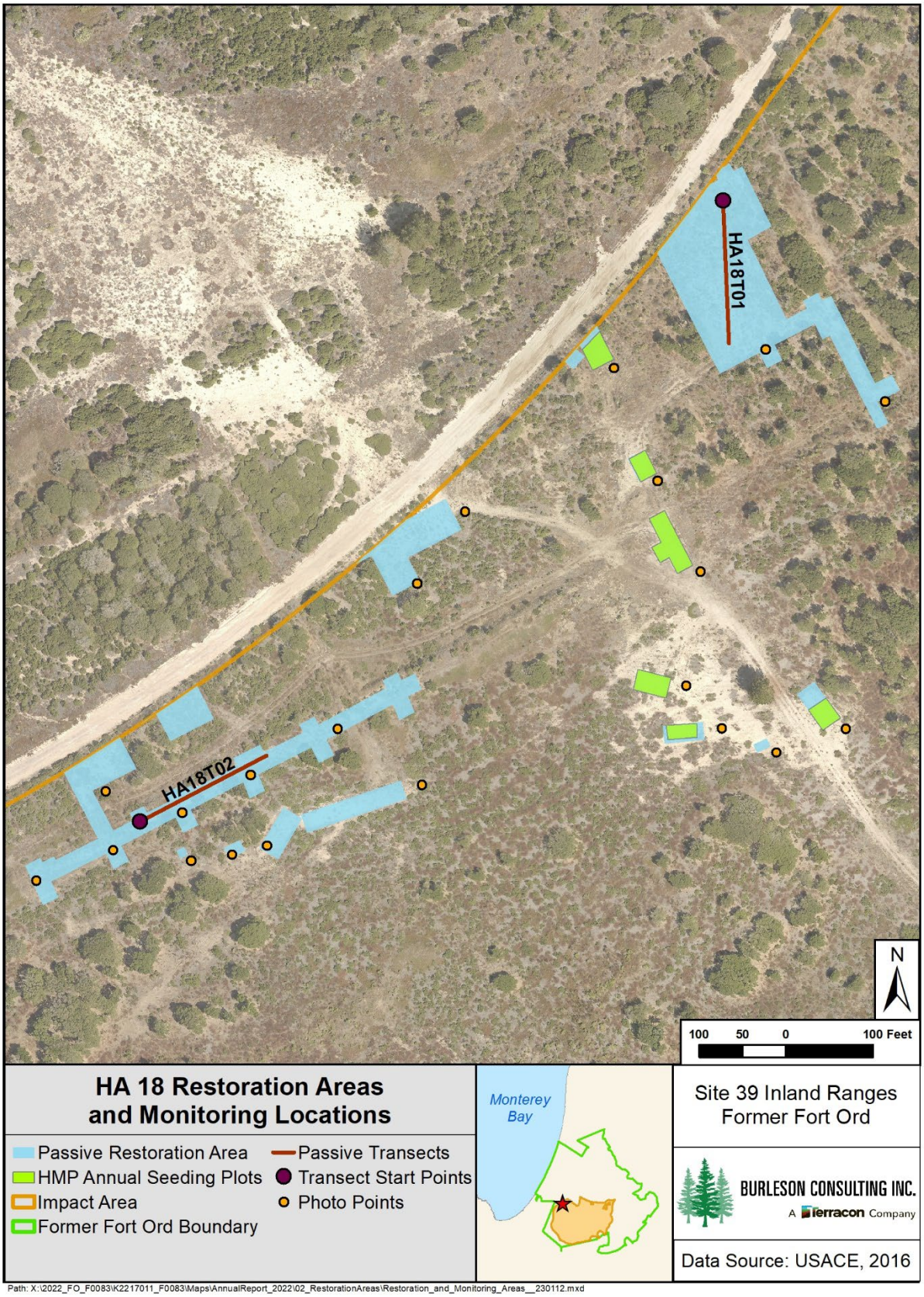


Figure 9-1. HA 18 Restoration Areas and Monitoring Locations Map

Table 9-2. Success Criteria and Acceptable Limits for Restoration of HA 18

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise shaggy-bark manzanita California sage brush coyote brush Monterey ceanothus† dwarf ceanothus mock heather Eastwood's goldenbush† golden yarrow peak rush-rose deerweed sticky monkeyflower coast live oak black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 2 (1-5% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Monterey ceanothus percent cover, as an average of transect data, must be equal to or greater than 4.
			Sandmat manzanita percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
			Eastwood gold fleece percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.

Table 9-2. Success Criteria and Acceptable Limits for Restoration of HA 18

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.1.1 Restoration Activities

Burleson performed passive restoration at HA 18 in 2012 and 2019. No additional passive restoration activities occurred in 2022. The total amount of seed broadcast on site was 53.189 lb compared to the 50.220 lb prescribed in the SSRP. Table 9-3 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Six plots were chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations (see Figure 9-1).

Table 9-3. Summary of Passive Restoration Activities for HA 18

Species	**Pounds of Seed Broadcast**				
	SSRP Target	**2012 (Jan)**	**2012 (Dec)**	**2019**	**Total by Species**
ACGL	2.800	1.000	1.440	-	2.440
ACMI	-	-	-	0.300	0.300
ADFA	1.400	0.500	0.770	-	1.270
ARPU*	1.400	1.100	1.000	-	2.100
ARTO	2.800	1.000	1.450	-	2.450
ARCA	1.400	0.500	0.730	-	1.230
BAPI	0.200	0.500	0.110	-	0.610
CERI*	1.400	0.500	0.780	-	1.280
CHPUP*	0.020	0.400	0.047	-	0.447
CRSC	1.400	0.500	0.770	-	1.270
DIAU	0.100	0.300	0.390	-	0.690
ELGL	12.600	-	12.650	0.800	13.450
ERER	0.400	0.200	0.230	-	0.430
ERFA*	0.100	0.072	0.070	-	0.142
ERCO	0.400	0.200	0.240	-	0.440
HO	12.600	-	12.700		12.700
HOCU	2.800	1.000	1.160	0.400	2.560
SAME	1.400	0.600	0.820	-	1.420
STCE	7.000	0.300	7.160	-	7.460
STPU	-	-	-	0.500	0.500
TOTAL	**50.220**	**8.672**	**42.517**	**2.000**	**53.189**

* HMP species

No active restoration was prescribed at HA 18; however, AMP planting events occurred in 2019 and 2020 per recommendations made in the 2017 Annual Report (Burleson, 2018). An additional AMP planting event occurred in 2022 per recommendations made in the 2020 Annual Report (Burleson, 2021). A total of 353 plants were installed at HA 18. Table 9-4 summarizes the plants installed during active restoration.

Table 9-4. Summary of Active Restoration Activities for HA 18

Species	Number of Individual Plants			
	2019	2020	2022	Total by Species
ADFA	40	-		40
ARPU*	-	84		84
CEDE	-	-	25	25
CERI*	-	55	100	155
ERFA*	-	49		49
TOTAL	**40**	**188**	**125**	**353**

*HMP species

9.1.2 Monitoring Results

HA 18 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-1).

9.1.3 HA Status Discussion

In 2017, year 5 of monitoring, HA 18 met three of six success criteria. In 2020, year 8 of monitoring, the site met four of six success criteria. Overall, the site is on trajectory to meet all success criteria by monitoring year 13, 2025 (see Table 9-5).

Per previous recommendations in the 2017 and 2020 Annual Reports, chamise (*Adenostoma fasciculatum*) was planted in the 2018/2019 season to meet the species richness criterion, Monterey ceanothus was planted in the 2019/2020 season and the 2022/2023 season to support the HMP shrub cover criterion, and dwarf ceanothus was planted in the 2021/2022 season to meet the success criterion for species richness (Burleson, 2018; Burleson, 2021). The Army has no further recommendations at this time. Overall, HA 18 needs time to respond to previous restoration efforts. A qualitative overview was documented by photo points (see Appendix D, page D-1).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-1).

Table 9-5. Status for Achieving Success Criteria at HA 18

Success Criterion	Category	Acceptable Limit	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	14 required species: ACGL, ADFA, ARCA, ARTO, BAPI, CERI, CEDE, CRSC, DIAU, ERER, ERFA, ERCO, QUAG, SAME	No	No	HIGH	**Year 5:** ADFA absent **Year 8:** CEDE absent (ADFA planted in 2018/2019, CEDE planted in 2022/2023)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	Yes	Yes	HIGH	**Year 5**: 45.34% **Year 8**: 52.59%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.80% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 2: 1-5%	No	Yes	HIGH	**Year 5**: 0.69% **Year 8**: 4.13%
Objective 3 – No. 4	HMP shrub cover by species	CERI ≥ 4%, ARPU = present ERFA = present	No	No	LOW for CERI HIGH for ARPU HIGH for ERFA	**Year 5**: CERI 0.00% ARPU 0.56% ERFA 0.13% **Year 8**: CERI 0.10% ARPU 3.27% ERFA 0.76% (CERI, ARPU, ERFA planted in 2019/2020. CERI planted in 2022/2023)
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Yes	NA	**Year 5**: met **Year 8**: met (Year 13 monitoring not required)

9.2 HA 19

HA 19 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010 and resulted in the excavation of 23,000 cubic yards of lead-contaminated soil from approximately 14 acres (Shaw, 2008). HA 19 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 19 is relatively flat with a western aspect. Adjacent lands are high quality habitat with intact native vegetation that may promote natural recruitment within restoration areas.

HA 19 is located on the western portion of Site 39, occurring within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. The vegetative habitat at HA 19 prior to remediation was predominantly very high-quality maritime chaparral. The HA 19 SSRP includes a detailed list of the typical vegetation identified at the HA.

The SSRP restoration procedure for HA 19 included both passive and active restoration consisting of hand broadcast non-irrigated seed mix and installing container-grown plants. Areas within HA 19 which were less than 1.0 acre, or larger than 1.0 acre but less than 100 feet wide, were restored passively using broadcast seed. Areas larger than 1.0 acre and greater than 100 feet across received both active and passive restoration efforts.

Restoration at HA 19 occurred in 2012 through 2016, 2019, and 2020 and quantitative monitoring began in 2013. The site was monitored for 11 years by photo documentation and site visits, eight years for HMP annual density in plots, six years for HMP annual density across the HA, four years for species richness, vegetative cover, and plant survivorship (see Table 9-6). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-2 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. The success criteria for HA 19 are summarized in the Table 9-7.

Table 9-6. Historic Summary of Restoration and Monitoring Activities at HA 19

Activity	Monitoring Years											
			1	2	3	4	5	6	7	8	9	13
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2026
Restoration: Active and Passive	●	●	●	●	●			●	●			
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●		●	●	●			●		
Sand Gilia Plots				●	●	●	●	●			●	
HMP Annual Density across HA					●	●	●	●		●	●	
Species Richness					●	●	●			●		●
Vegetative Cover					●	●	●			●		●
Plant Survivorship		●	●	●	●							

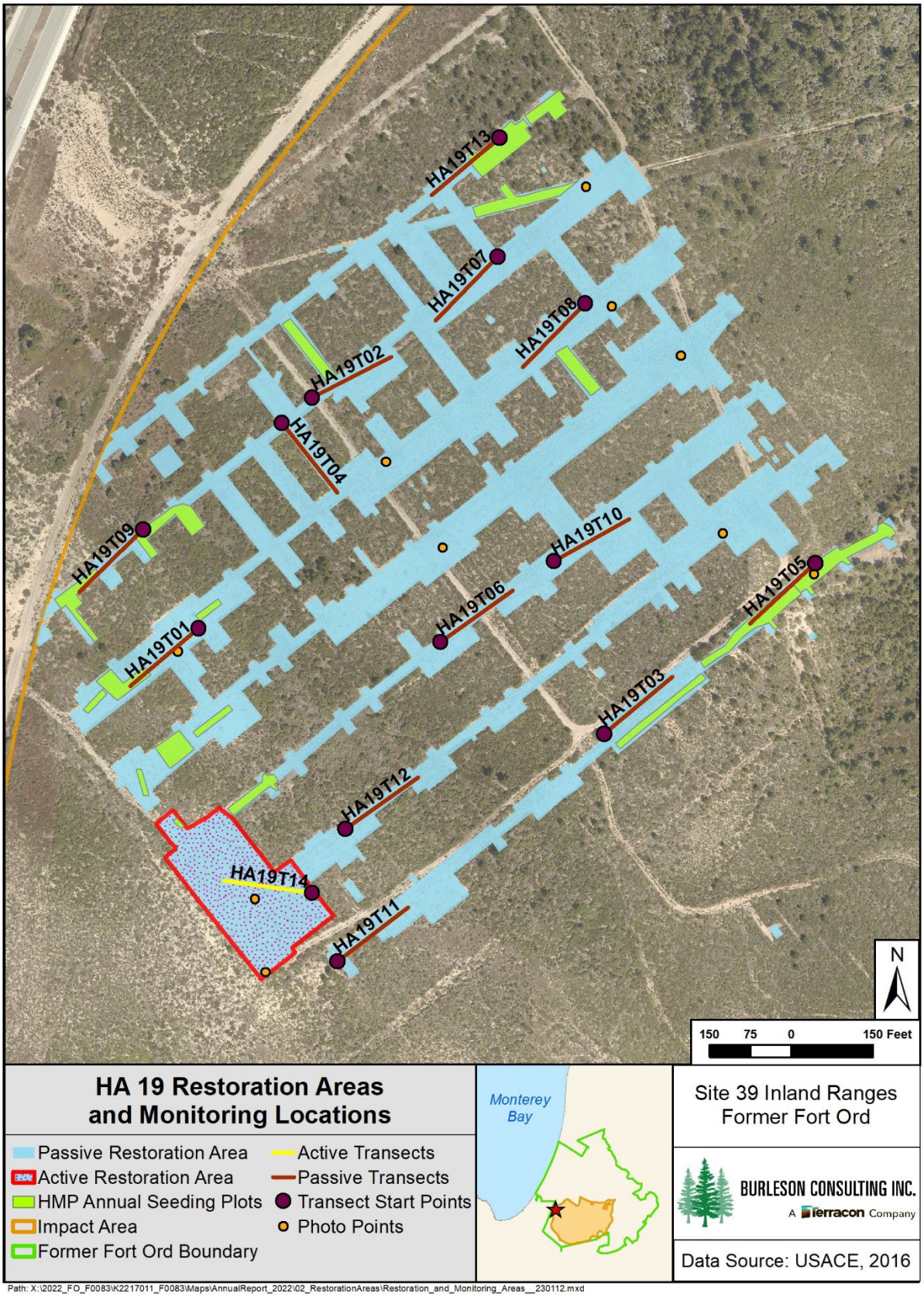


Figure 9-2. HA 19 Restoration Areas and Monitoring Locations Map

Table 9-7. Success Criteria and Acceptable Limits for Restoration of HA 19

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise sandmat manzanita† shaggy-bark manzanita California sagebrush coyote brush Monterey ceanothus† mock heather Eastwood's goldenbush† golden yarrow pitcher sage deerweed sticky monkeyflower coast live oak black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40% for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 16.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
			Eastwood's goldenbush percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.

Table 9-7. Success Criteria and Acceptable Limits for Restoration of HA 19

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low Sand gilia density class: Low

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.2.1 Restoration Activities

Burleson performed passive restoration at HA 19 in 2013, 2015, 2016, and 2020. The total amount of seed broadcast on site was 421.85 lb compared to 517.00 lb prescribed in the SSRP. Total seed broadcast is less than SSRP prescription because the site is recovering well and will likely not need the full prescription to meet the success criteria. Table 9-8 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species sand gilia and Monterey spineflower. Nine plots were chosen in the HA based on having suitable habitat for the HMP annuals and adjacent extant populations (see Figure 9-2).

Table 9-8. Summary of Passive Restoration Activities for HA 19

Species	Pounds of Seed Broadcast						
	SSRP Target	2013 (Jan)	2013 (Nov)	2015	2016	2020	Total by Species
ACMI	14.00	3.50	5.00	-	7.99	8.00	24.49
ACGL	28.00	7.00	10.00	-	16.00	8.00	41.00
ADFA	14.00	3.50	-	-	4.00	-	7.50
ARPU*	14.00	3.90	5.00	-	-	-	8.90
ARTO	28.00	7.00	-	-	-	-	7.00
ARCA	14.00	3.50	5.00	-	4.00	-	12.50
BAPI	2.10	0.53	1.00	-	4.00	-	5.53
CEDE	-	-	-	-	4.00	-	4.00
CERI*	14.00	3.70	5.00	-	4.00	-	12.70
CHPUP*	0.20	0.18	-	-	-	-	0.18
CRSC	14.00	3.50	5.00	-	4.00	-	12.50
DIAU	1.40	2.10	3.00	-	0.40	-	5.50
ELGL	126.00	31.70	45.00	-	36.00	12.00	124.70
ERER	3.50	0.88	0.50	-	-	-	1.38
ERFA*	1.40	0.37	1.50	-	0.40	-	2.27
ERCO	4.20	1.10	1.50	-	5.20	-	7.80
GITEA*	0.20	-	-	0.20	-	-	0.20
HO	126.00	31.70	45.00	-	-	-	76.70
HOCU	28.00	7.00	10.00	-	16.00	-	33.00
LUAR	-	-	-	-	3.00	-	3.00
LUNA	-	-	-	-	1.00	-	1.00
SAME	14.00	3.50	5.00	-	4.00	-	12.50
STCE	70.00	17.50	-	-	-	-	17.50
TOTAL	**517.00**	**132.16**	**147.50**	**0.20**	**113.99**	**28.00**	**421.85**

* HMP species

Active restoration was conducted in 2013, 2014, 2019, and 2020 at HA 19; SSRP planting was completed in 2014. Per recommendations made in the 2016 Annual Report, AMP planting events occurred in 2019 and 2020 (Burleson, 2017). The total number of plants installed at HA 19 was 3,490 compared to 2,462 prescribed in the SSRP. Table 9-9 summarizes the plants installed during active restoration.

Table 9-9. Summary of Active Restoration Activities for HA 19

Species	Number of Individual Plants					
	SSRP Target	2013	2014	2019	2020	Total by Species
ACMI	75	117	-	-	-	117
ACGL	250	250	-	-	-	250
ADFA	100	37	63	-	-	100
ARPU*	80	255	-	-	400	655
ARTO	150	24	126	-	-	150
ARCA	52	68	-	-	-	68
BAPI	150	150	-	-	-	150
CERI*	50	66	53	-	-	119
CRSC	250	250	5	-	-	255
DIAU	250	262	-	-	-	262
ELGL	55	138	-	-	-	138
ERER	50	33	25	-	-	58
ERFA*	50	97	-	-	-	97
ERCO	200	186	14	-	-	200
HOCU	250	9	241	-	-	250
LECA	-	-	-	160	-	160
LUAL	-	-	9	-	-	9
SAME	250	227	25	-	-	252
STCE	200	200	-	-	-	200
TOTAL	**2,462**	**2,369**	**561**	**160**	**400**	**3,490**

* HMP species

9.2.2 Monitoring Results

HA 19 was in year 9 of monitoring in 2022. Year 9 does not require monitoring however, initial sand gilia plot seeding was delayed at HA 19 so plots were monitored in 2022 for year 8 (Burleson, 2014). Additionally, site visits and photo documentation were completed (see Appendix D, page D-2).

9.2.2.1 HMP Annual Density

Sand gilia restoration plots were monitored for density at HA 19 in 2022.

Nine sand gilia restoration plots were surveyed for year 8 density at HA 19 in 2022. The plots are numbered 1-9 on Figure 9-4 and are primarily located on the southwestern portion of the site. Sand gilia densities were low at Plots 3, 5, 7, and 8. Sand gilia was not present at Plots 1, 2, 4, 6, and 9. Figure 9-3 presents all sand gilia restoration plot densities for HA 19.

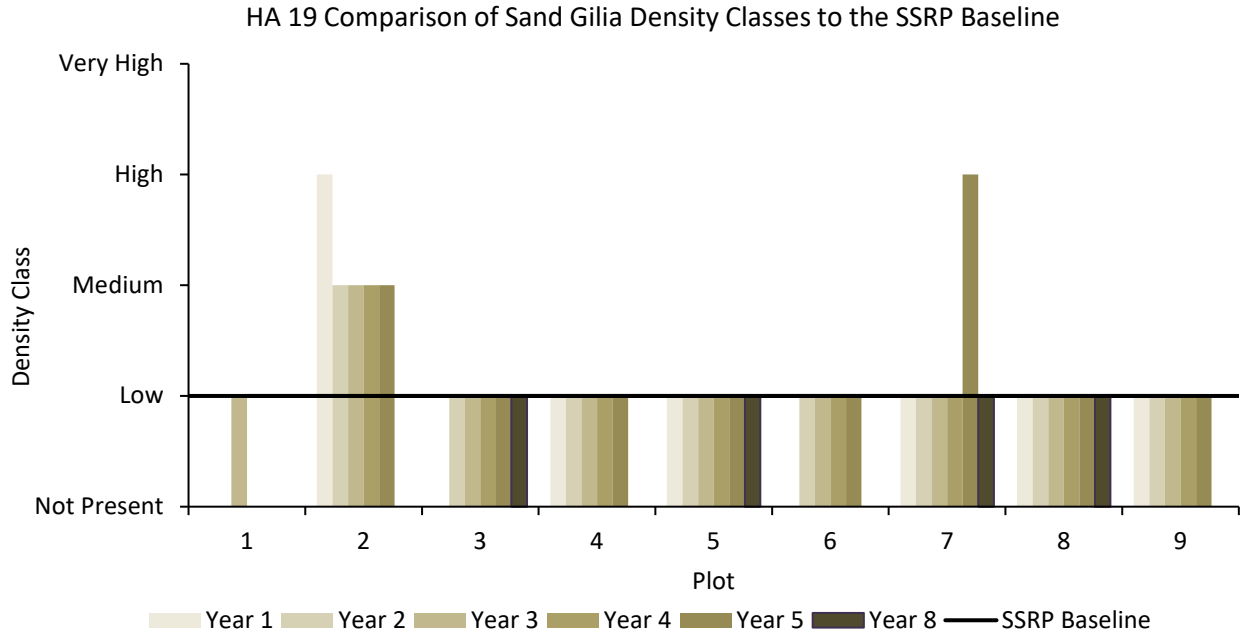


Figure 9-3. HA 19 Comparison of Sand Gilia Density Classes to the SSRP Baseline for Plots 1-9

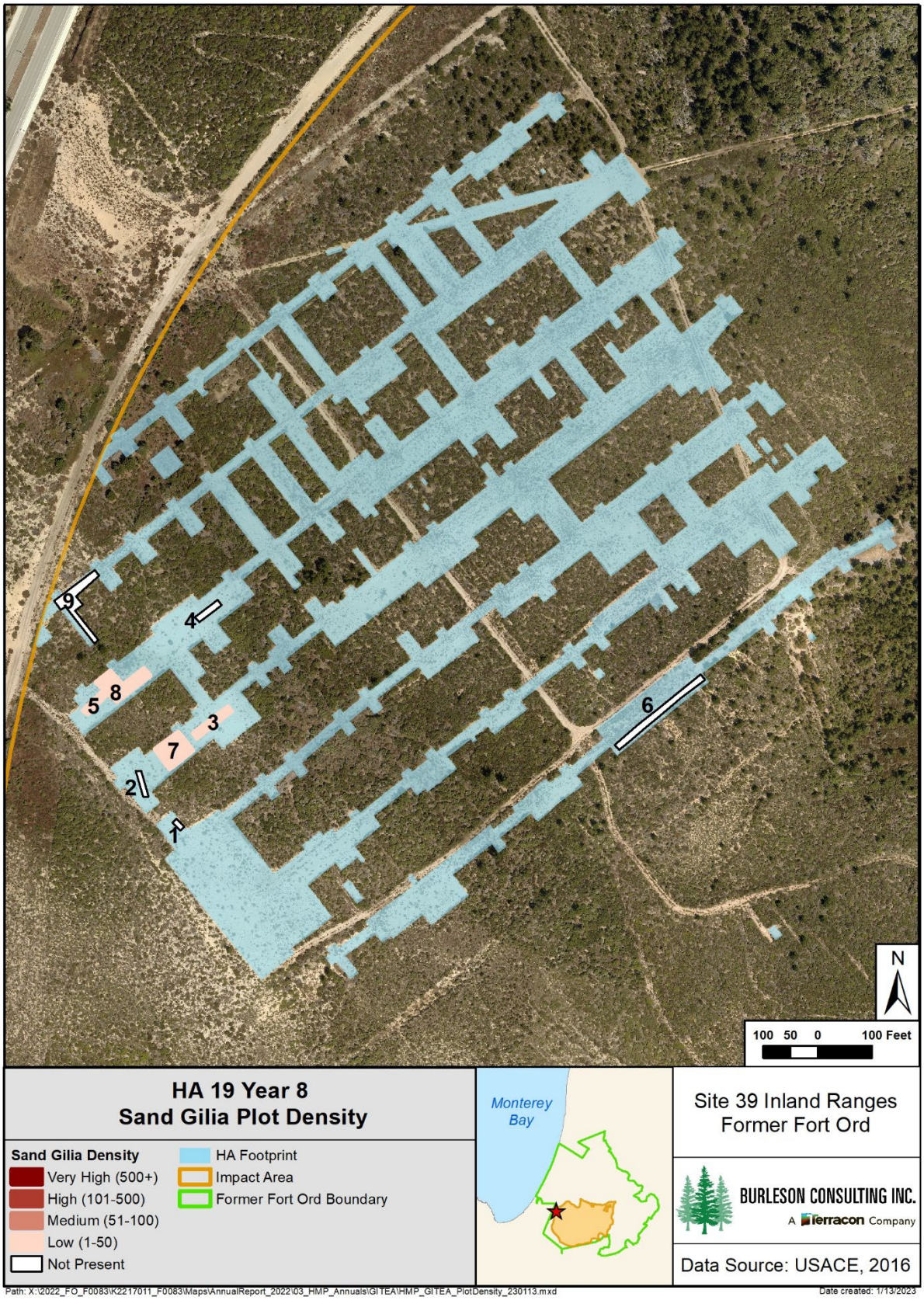


Figure 9-4. HA 19 Year 8 Sand Gilia Plot Density Map

HMP annual density monitoring includes mapping discrete patches of HMP annuals within the restoration site but outside of the HMP annual restoration plots. This survey was completed for sand gilia at HA 19.

Thirty-seven individual plants and six discrete patches of sand gilia were mapped and individual plants were counted within each patch (see Figure 9-5). The density of patches ranged from low to high and the total acreage of sand gilia patches with a density at or above the SSRP baseline density class of low was 0.012 acres. From 2019 to 2022, the density range and acreage above the SSRP baseline decreased.

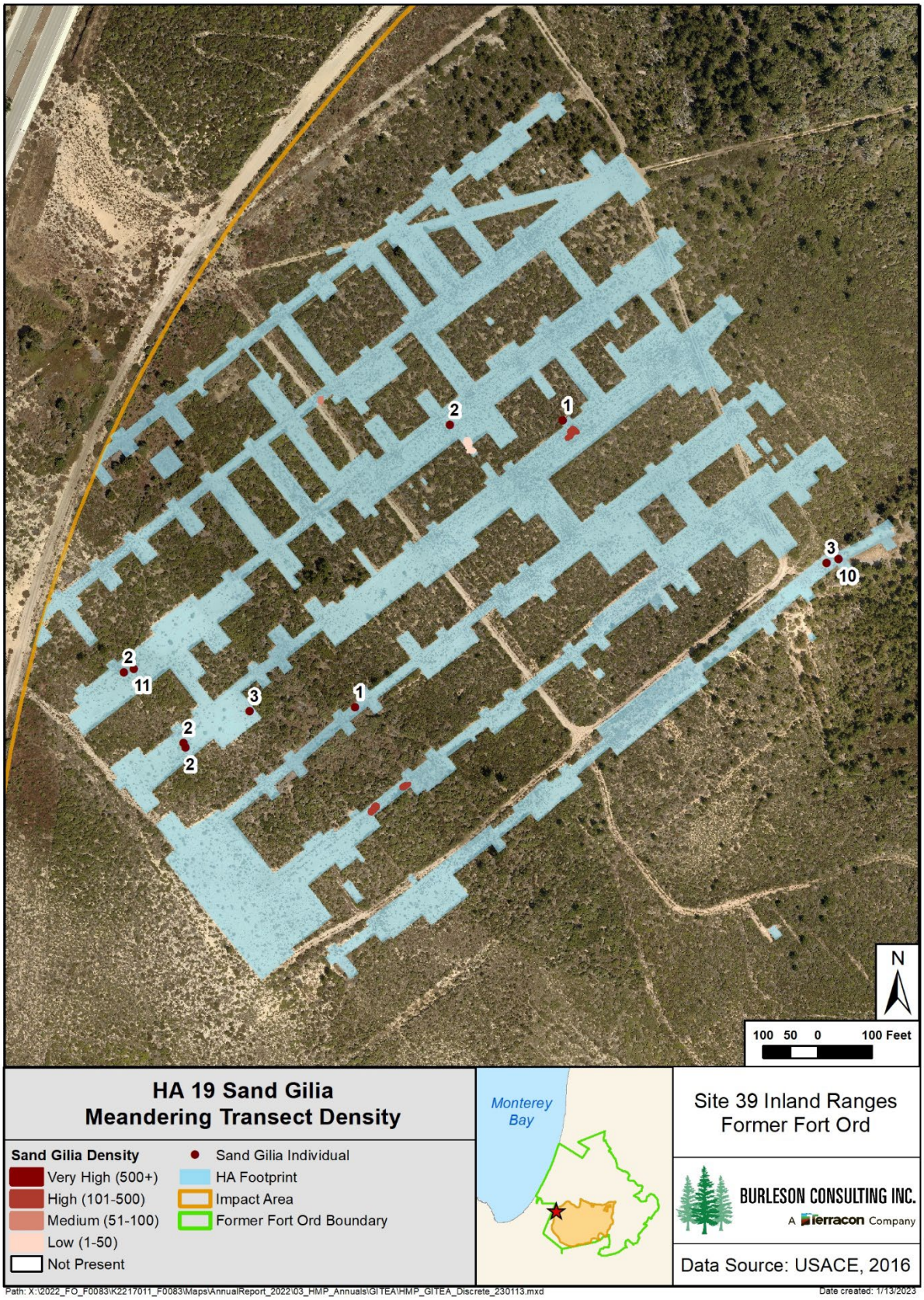


Figure 9-5. HA 19 Sand Gilia Density Map

9.2.3 Monitoring Results Discussion

9.2.3.1 HMP Annual Density

In 2022, sand gilia was in year 8 of monitoring and was within the acceptable limit for HMP annual density at HA 19. The SSRP baseline density class for sand gilia was low. Year 8 sand gilia restoration plots results show that the density met the success criterion under Objective 3 for four out of nine plots. In addition, sand gilia was present outside the restoration plots. Discrete patches, with densities that met or exceeded the success criterion, covered 0.012 acres of HA 19 (see Figure 9-5). HA 19 met the success criterion for sand gilia density.

9.2.4 HA Status Discussion

In 2022, HA 19 was in year 9 of monitoring. Only monitoring occurred for sand gilia (year 8) and results showed restoration plot densities met the success criterion under Objective 3.

In 2018, year 5 of monitoring, HA 19 met three of five success criteria. In 2021, year 8 of monitoring, the site met four of five success criteria. Overall, the site is on trajectory to meet all success criteria by year 13 of monitoring, 2026 (see Table 9-10).

Per previous recommendations in the 2016 Annual Report, pitcher sage (*Lepechinia calycina*) was planted in the 2018/2019 season and sandmat manzanita was planted in the 2019/2020 season to meet the success criteria for species richness and HMP shrub cover (Burleson, 2017). Additionally, the access road to HA 19 is no longer being used to allow it to naturally recover with native vegetation. The Army has no further recommendations at this time. Overall, HA 19 requires more time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-2).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in year 13, 2026 (see Table 9-6).

Table 9-10. Status for Achieving Success Criteria at HA 19

Success Criterion	Category	Acceptable Limit	Year 5 (2018) Met	Year 8 (2021) Met	Likelihood of Achieving Success by Year 13 (2026)	Notes
Objective 1 – No. 1	Species richness	14 required species: ADFA, ARTO, ARCA, BAPI, CERI, ERER, ERFA, ERCO, LECA, ACGL, DIAU, QUAG, SAME	No	Yes	HIGH	**Year 5**: LECA absent **Year 8**: met (LECA planted in 2018/2019)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	HIGH	**Year 5**: 34.98% **Year 8**: 36.29%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Yes	Yes	HIGH	**Year 5**: 10.91% **Year 8**: 18.86%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 16% CERI present ERFA present	No	Yes	HIGH for ARPU HIGH for CERI HIGH for ERFA	**Year 5**: ARPU 10.59% CERI 0.08% ERFA 0.25% **Year 8**: ARPU 18.09% CERI 0.34% ERFA 0.43% (ARPU planted in 2019/2020)
Objective 3 – No. 4	HMP annual density	Low density for CHUPUP and GITEA	Yes	Yes	NA	**Year 5**: met **Year 8**: met (Year 13 monitoring not required)

9.3 HA 22

HA 22 was used by the Army as a long-distance small-arms firing range with targets and no berm. Soil remediation was completed in 2010; 100 cubic yards of lead-contaminated soil were excavated from 0.05 acres (Shaw, 2008). HA 22 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 22 is relatively flat with northwest and west aspects. Adjacent lands were not developed and contain intact native vegetation that may promote natural recruitment within restoration areas.

HA 22 is located on the western portion of Site 39 within sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 22 consisted of hand-broadcast non-irrigated seed and annual weed management activities. HA 22 is relatively flat with little potential for erosion.

Restoration at HA 22 occurred in 2011, 2012, 2019, and 2022 and quantitative monitoring began in 2013. The site was monitored for 12 years by photo documentation and site visits, seven years for HMP annual density in plots, and four years for HMP annual density across the HA, species richness, and vegetative cover (see Table 9-11). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-6 shows the historic area footprint, passive restoration area and transect monitoring locations. Success criteria for HA 22 are summarized in Table 9-12.

Table 9-11. Historic Summary of Restoration and Monitoring Activities at HA 22

Activity	Monitoring Years												
			1	2	3	4	5	6	7	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025
Restoration: Active and Passive	●	●							●			●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●		●			
HMP Annual Density across HA						●	●	●		●			
Species Richness						●	●	●		●			●
Vegetative Cover						●†	●	●		●			●

† Vegetative cover was monitored using quadrats in 2016

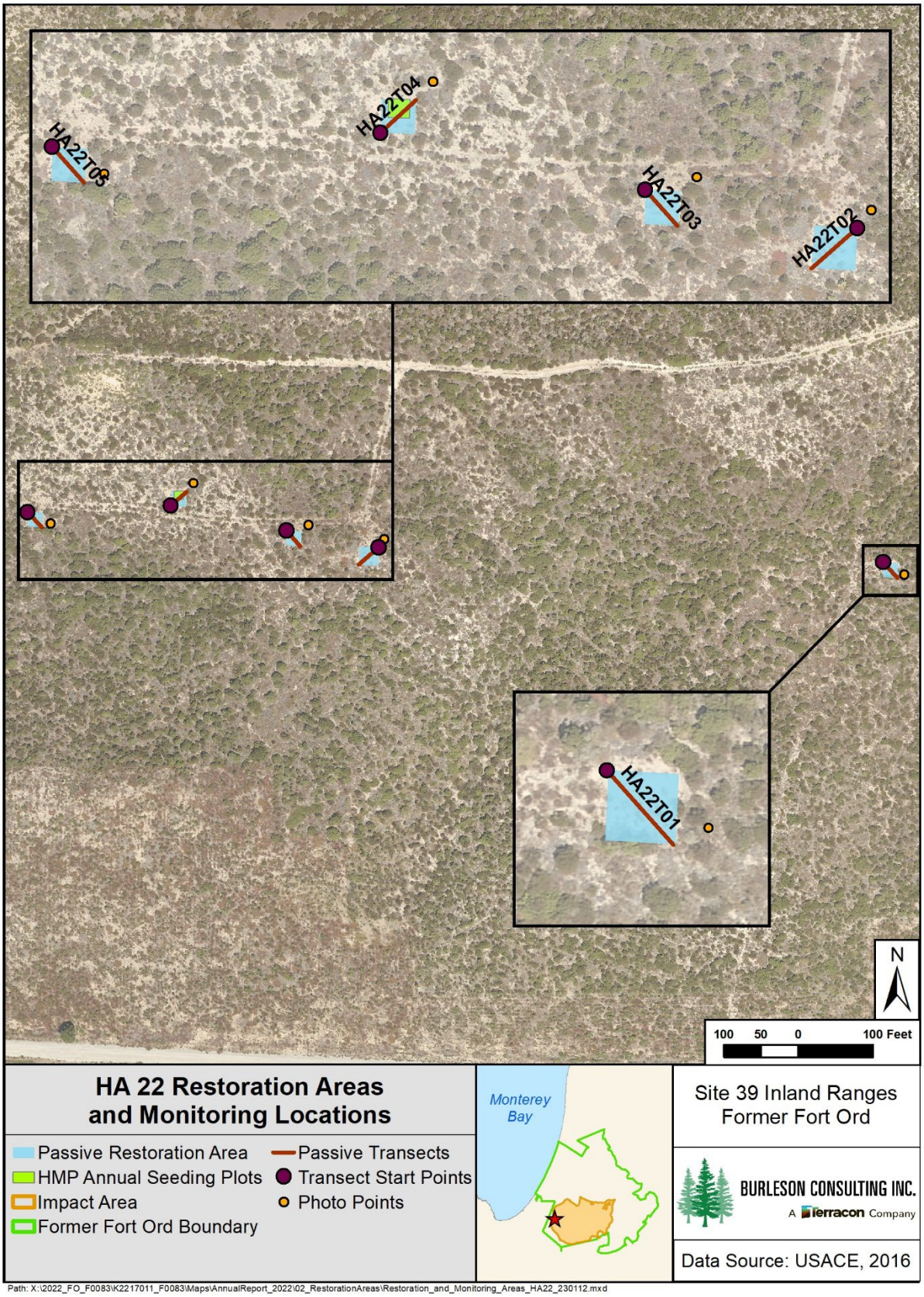


Figure 9-6. HA 22 Restoration Areas and Monitoring Locations Map

Table 9-12. Success Criteria and Acceptable Limits for Restoration of HA 22

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline	Native species that must be present to demonstrate richness:
			chamise shaggy-bark manzanita sandmat manzanita† coyote brush Monterey ceanothus† dwarf ceanothus Monterey spineflower† mock heather Eastwood's goldenbush† golden yarrow peak rush-rose deerweed sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or lessthan 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25%)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 20.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 4.
			Eastwood's goldenbush percent cover, as an average of transect data, must be equal or greater than 1.

Table 9-12. Success Criteria and Acceptable Limits for Restoration of HA 22

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.3.1 Restoration Activities

Burleson performed passive restoration at HA 22 in 2011 and 2012. The total amount of seed broadcast on site was 1.219 lb compared to the 1.243 lb prescribed in the SSRP. No additional passive restoration activities occurred in 2022. Table 9-13 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower. One plot was chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations (see Figure 9-6).

Table 9-13. Summary of Passive Restoration Activities for HA 22

Species	**Pounds of Seed Broadcast**			
	SSRP Target	**2011**	**2012**	**Total by Species**
ACGL	0.100	0.051	0.059	0.110
ACMI	0.050	0.026	0.032	0.058
ADFA	0.050	0.028	0.032	0.060
ARPU*	0.050	0.027	0.040	0.067
ARTO	0.100	0.052	0.062	0.114
BAPI	0.008	-	0.006	0.006
CERI*	0.050	0.028	0.028	0.056
CHPUP*	0.001	0.011	0.005	0.016
CRCA	0.050	0.026	0.032	0.058
CRSC	0.050	0.028	0.029	0.057
DIAU	0.005	0.016	0.025	0.041
ERCO	0.015	0.011	0.012	0.023
ERER	0.013	0.009	0.014	0.023
ERFA*	0.001	-	0.002	0.002
HOCU	0.100	0.051	0.058	0.109
HO	0.450	-	0.239	0.239
SAME	0.050	0.037	0.032	0.069
STCE	0.100	0.051	0.060	0.111
TOTAL	**1.243**	**0.452**	**0.767**	**1.219**

* HMP species

No active restoration was prescribed at HA 22; however, AMP planting events occurred in 2019 and 2022 per recommendations made in the 2018 and 2020 Annual Reports respectively (Burleson, 2019; Burleson, 2021). A total of 225 plants were installed at HA 22. Table 9-14 summarizes the plants installed during active restoration.

Table 9-14. Summary of Active Restoration Activities for HA 22

Species	Number of Individual Plants		
	2019	2022	Total by Species
ARPU*	20	20	40
ARTO	10		10
BAPI	10		10
CEDE	20		20
CERI*	20	20	40
DIAU	8		8
ERCO	10		10
ERER	6		6
ERFA*	35	40	75
SAME	6		6
TOTAL	**145**	**80**	**225**

*HMP species

9.3.2 Monitoring Results

HA 22 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-3).

9.3.3 HA Status Discussion

In 2017, year 5 of monitoring, HA 22 met three of six success criteria. In 2020, year 8 of monitoring, the site met four of six success criteria. The site is positively trending toward meeting most success criteria, but it is unlikely to meet all criteria by year 13 of monitoring, 2025. HA 22 has a moderate chance of meeting the HMP shrub cover criterion by 2025 and a low chance of meeting HMP shrub cover by species by 2025 (see Table 9-15).

Per previous recommendations in the 2016 Annual Report, sandmat manzanita, shaggy-bark manzanita (*Arctostaphylos tomentosa*), coyote brush (*Baccharis pilularis*), Monterey ceanothus, dwarf ceanothus, mock heather (*Ericameria ericoides*), Eastwood's goldenbush, golden yarrow (*Eriophyllum confertiflorum*), sticky monkeyflower (*Diplacus aurantiacus*), and black sage (*Salvia mellifera*) were planted in the 2018/2019 season to support the species richness and HMP shrub cover criteria (Burleson, 2017). Additionally, sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush were planted in late 2022 to support the HMP shrub cover and HMP shrub cover by species success criteria. The Army has no further recommendations at this time. HA 22 was last monitored in 2020 and AMP planting occurred in the 2022/2023 wet season. The site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-3).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-11).

Table 9-15. Status for Achieving Success Criteria at HA 22

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	14 required species: ADFA, ARTO, ARPU, BAPI, CERI, CEDE, CHPUP, ERER, ERFA, ERCO, CRSC, ACGL, DIAU, SAME	No	Yes	HIGH	**Year 5:** 5 required species absent **Year 8:** met (Planted absent species in 2018/2019)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	Yes	Yes	HIGH	**Year 5:** 43.49% **Year 8:** 48.40%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5:** 0.00% **Year 8:** 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	No	No	MODERATE	**Year 5:** 1.16% **Year 8:** 2.65% (AMP planting in 2019 and 2022)
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 20% CERI ≥ 4% ERFA ≥ 1%	No	No	LOW for ARPU LOW for CERI LOW for ERFA	**Year 5:** ARPU 1.16%, CERI 0.00%, ERFA 0.00% **Year 8:** ARPU 2.65% CERI 0.00% ERFA 0.00% (Planted ARPU, CERI, and ERFA in 2018/2019 and 2022/2023)
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Yes	NA	**Year 5:** met **Year 8:** met (Year 13 monitoring not required)

9.4 HA 23

HA 23 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010; 450 cubic yards of lead-contaminated soil were excavated from 0.3 acres (Shaw, 2008). HA 23 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 23 is relatively flat with a west aspect. Adjacent lands were not developed and contain intact native vegetation that may promote natural recruitment within restoration areas.

HA 23 is located on the western portion of Site 39, occurring within sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 23 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 23 is relatively flat with little potential for erosion.

Restoration at HA 23 occurred in 2011, 2012, 2019, 2020, and 2023 and quantitative monitoring began in 2014. The HA was monitored for 12 years by photo documentation and site visits, six years for HMP annual density in plots, and four years for HMP annual density across the HA, species richness, and vegetative cover (see Table 9-16). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-7 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 23 are summarized in Table 9-17.

Table 9-16. Historic Summary of Restoration and Monitoring Activities at HA 23

Activity	Monitoring Years													
			1	2	3	4	5	6	7	8	9	10	11	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2025
Restoration: Active and Passive	●	●							●	●			●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			†	●	●	●	●	●		●				
HMP Annual Density across HA						●	●	●		●				
Species Richness						●	●	●		●				●
Vegetative Cover						●‡	●	●		●				●

† Monterey spineflower was not monitored in year 1 (2013) because of UXO presence and mastication activities

‡ Vegetative cover was monitored using quadrats in 2016

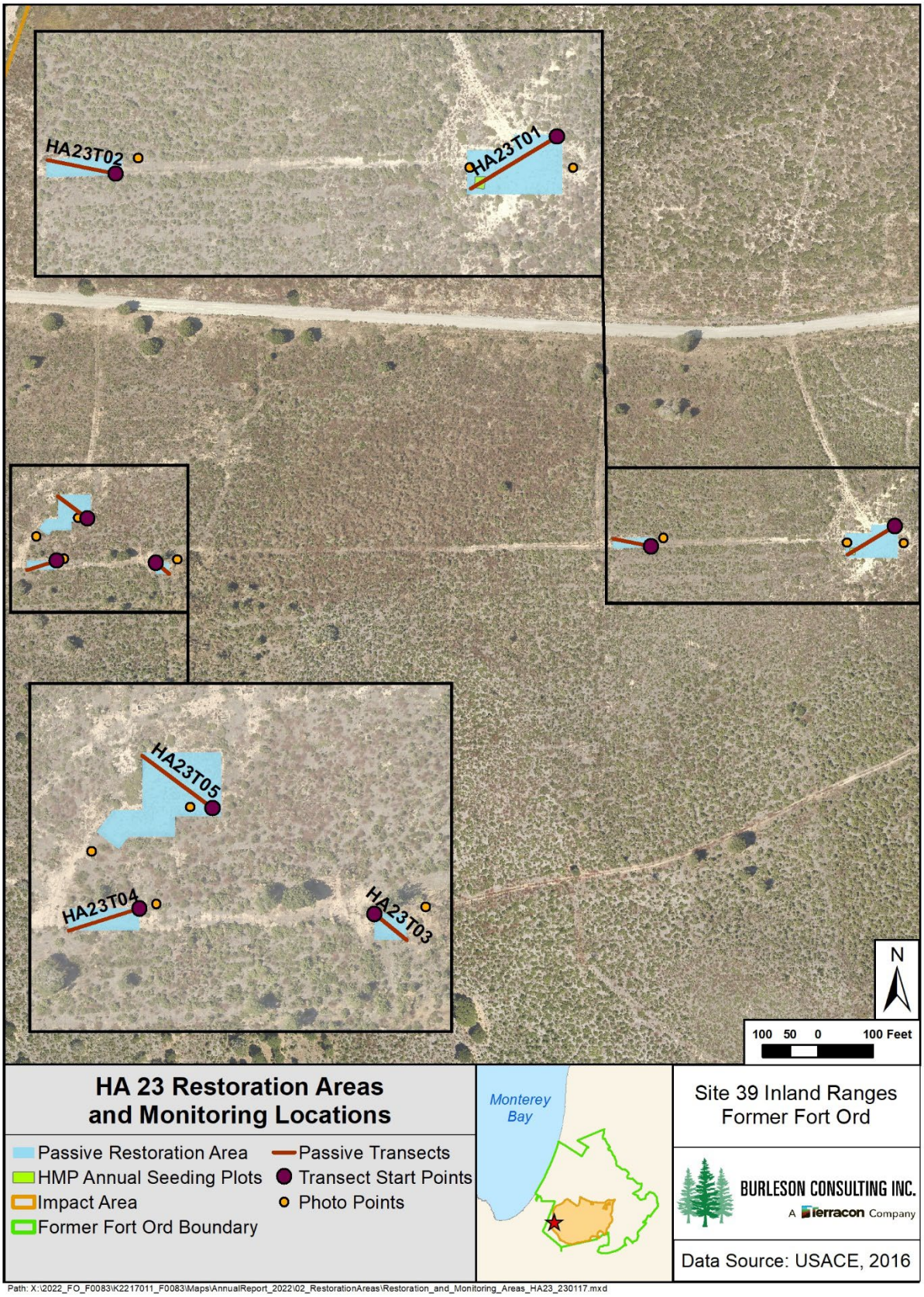


Figure 9-7. HA 23 Restoration Areas and Monitoring Locations Map

Table 9-17. Success Criteria and Acceptable Limits for Restoration of HA 23

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise shaggy-bark manzanita sandmat manzanita† coyote brush Monterey ceanothus† dwarf ceanothus Monterey spineflower† mock heather Eastwood's goldenbush† golden yarrow peak rush-rose deerweed sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 20.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 4.
			Eastwood's goldenbush percent cover, as an average of transect data, must be equal or greater than 1.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

9.4.1 Restoration Activities

Burleson performed passive restoration at HA 23 in 2011, 2012, 2019, and 2020. The total amount of seed broadcast on site was 15.652 lb compared to 7.285 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-18 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower. One plot was chosen in the HA based on its suitable habitat for Monterey spineflower and adjacent extant populations (see Figure 9-7).

Table 9-18. Summary of Passive Restoration Activities for HA 23

Species	Pounds of Seed Broadcast					
	SSRP Target	2011	2012	2019	2020	Total by Species
ACGL	0.600	0.300	0.306	-	1.600	2.206
ACMI	0.300	0.200	0.159	0.300	1.600	2.259
ADFA	0.300	0.200	0.159	-	-	0.359
ARPU*	0.300	0.600	0.175	-	-	0.775
ARTO	0.600	0.300	0.326	-	-	0.626
BAPI	0.050	-	0.028	-	-	0.028
CERI*	0.300	0.088	0.248	-	-	0.336
CHPUP*	0.005	0.022	0.003	-	-	0.025
CRCA	0.080	0.200	0.158	-	-	0.358
CRSC	0.300	0.200	0.168	-	-	0.368
DIAU	0.030	0.088	0.105	-	-	0.193
ELGL	-	-	-	0.800	2.400	3.2
ERCO	0.090	0.490	0.058	-	-	0.548
ERER	0.080	0.420	0.044	-	-	0.464
ERFA*	0.050	0.028	0.026	-	-	0.054
HOCU	0.600	0.300	0.306	0.400	-	1.006
HO	2.700	-	1.370	-	-	1.37
SAME	0.300	0.200	0.162	-	-	0.362
STCE	0.600	0.300	0.315	-	-	0.615
STPU	-	-	-	0.500	-	0.5
TOTAL	**7.285**	**3.936**	**4.116**	**2.000**	**5.600**	**15.652**

* HMP species

No active restoration was prescribed at HA 23; however, AMP planting events occurred in 2019 and 2023 per recommendations made in the 2018 Annual Report (Burleson, 2019). A total of 155 plants were installed at HA 23. Table 9-19 summarizes the plants installed during active restoration.

Table 9-19. Summary of Active Restoration Activities for HA 23

Species	Number of Individual Plants		
	2019	2023 (Jan)	Total by Species
ARPU*	10		10
BAPI	6		6
CEDE	18		18
CERI*	20	20	40
ERCO	6		6
ERFA*	35	40	75
TOTAL	**95**	**60**	**155**

*HMP species

9.4.2 Monitoring Results

HA 23 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-4).

9.4.3 HA Status Discussion

In 2017 and 2020, year 5 and 8 of monitoring, HA 23 met four of six success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 23 has a low chance of meeting the HMP shrub cover by species criterion by 2025 for Eastwood's goldenbush, a moderate chance for Monterey ceanothus, and a high chance for sandmat manzanita (see Table 9-20).

Per previous recommendations in the 2018 Annual Report, sandmat manzanita, coyote brush, Monterey ceanothus, dwarf ceanothus, golden yarrow, and Eastwood's goldenbush were planted during the 2018/2019 season to support the native vegetation and HMP shrub cover success criteria and Monterey ceanothus and Eastwood's goldenbush were planted in the 2022/2023 season to support the HMP shrub cover by species criterion. The Army has no further recommendations at this time. HA 23 was last monitored in 2020 and AMP planting occurred in the 2022/2023 wet season. The site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-4).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in year 13, 2025 (see Table 9-16).

Table 9-20. Status for Achieving Success Criteria at HA 23

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	14 required species: ADFA, ARTO, ARPU, BAPI, CERI, CEDE, CHPUP, ERER, ERFA, ERCO, CRSC, ACGL, DIAU, SAME	Yes	Yes	HIGH	**Year 5:** met **Year 8:** met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	HIGH	**Year 5:** 22.99% **Year 8:** 30.66%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5:** 0.00% **Year 8:** 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Yes	Yes	HIGH	**Year 5:** 7.46% **Year 8:** 16.34%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 20% CERI ≥ 4% ERFA ≥ 1%	No	No	HIGH for ARPU MODERATE for CERI LOW for ERFA	**Year 5:** ARPU 7.04% CERI 0.42% ERFA 0.00% **Year 8:** ARPU 15.19% CERI 1.14% ERFA 0.00% (CERI and ERFA planted in 2018/2019 and 2022/2023)
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Yes	NA	**Year 5:** met **Year 8:** met (Year 13 monitoring not required)

9.5 HA 26

HA 26 was used by the Army as an intermittent machine gun range, a dry fire movement course, and later as a squad automatic weapon range. An estimated total of 22,400 cubic yards of soil was excavated over approximately 14 acres. Much of the site was dominated by invasive species. The excavation removed many areas of invasive species and possibly aided in the revegetation effort for this range (Mactec, 2008). HA 26 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 26 is relatively flat with a northeast aspect and contains low to medium quality habitat.

HA 26 is located on the western portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP restoration procedure for HA 26 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and container-grown plant installation.

Restoration at HA 26 occurred from 2016 through 2022 and quantitative monitoring began in 2016. The HA was monitored for nine years by photo documentation and site visits; five years for HMP annual density in plots, HMP annual density across the HA, species richness, and plant survivorship; and four years for vegetative cover (see Table 9-21). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-8 shows the HA footprint, passive restoration area, and active restoration area. Success criteria for HA 26 are summarized in Table 9-22.

Table 9-21. Historic Summary of Restoration and Monitoring Activities at HA 26

Activity	Monitoring Years										
			1	2	3	4	5	6	7	8	13
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2028
Restoration: Active, Passive, Erosion Control, and Irrigation			●	●	●	●	●	●	●		
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●			●	
HMP Annual Density across HA			●	●	●	●	●			●	
Species Richness			●	●	●	●	●			●	●
Vegetative Cover				●	●	●	●			●	●
Plant Survivorship					●	●	●	●	●	●	

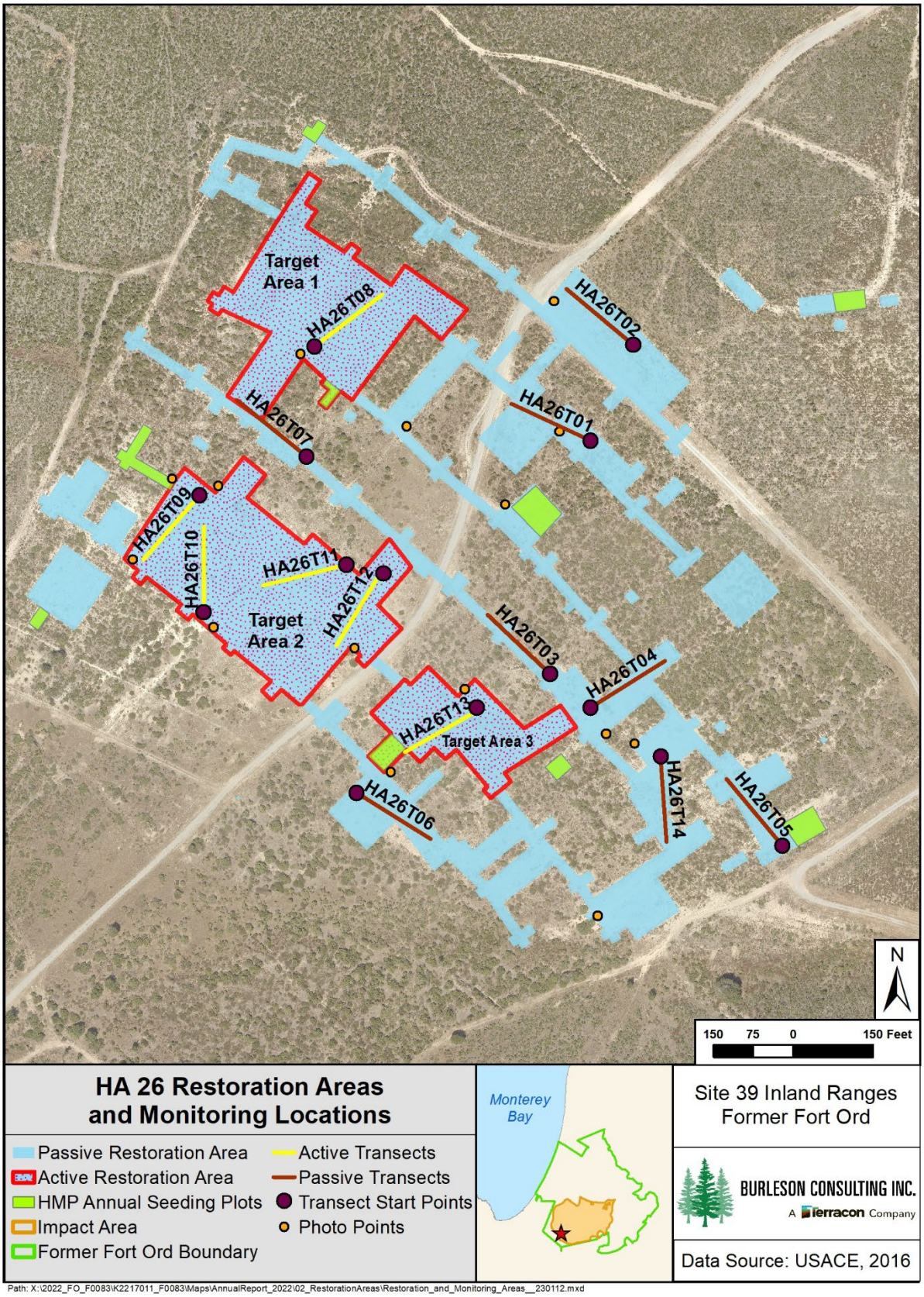


Figure 9-8. HA 26 Restoration Areas and Monitoring Locations Map

Table 9-22. Success Criteria and Acceptable Limits for Restoration of HA 26

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise sandmat manzanita† shaggy-bark manzanita Monterey ceanothus† Eastwood's goldenbush† sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 20 percent for native species‡	For the restoration area, percent cover monitoring data must meet or exceed 20 percent for native species listed as part of the plant palette in Table 2 of the SSRP‡
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did indicate presence of non-native target weed species jubata grass. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
			Eastwood's gold fleece percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

‡ 20 percent cover of native species is the revised success criteria due to the degraded conditions of the site prior to remediation - low quality habitat. However, the same restoration methods will be used and results will likely be similar to all restored areas.

9.5.1 Restoration Activities

Burleson performed passive restoration at HA 26 each year from 2016 to 2022. The total amount of seed broadcast on site was 740.77 lb compared to the 303.10 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-23 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Nine plots were chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations (see Figure 9-8).

Table 9-23. Summary of Passive Restoration Activities for HA 26

Species	Pounds of Seed Broadcast								
	SSRP Target	2016	2017	2018	2019	2020	2021	2022	Total by Species
ACMI	14.00	5.24	18.05	9.35	3.30	37.20	3.62	1.00	77.76
ACGL	28.00	10.48	10.17	4.00	7.00	43.20	8.25	2.00	85.10
BAPI	2.10	1.05	0.45	0.80	0.20	0.20	0.20	-	2.90
CERI*	14.00	5.24	2.27	4.00	1.00	1.00	1.01	-	14.52
CHPUP*	2.10	0.84	-	0.21	0.21	0.21	0.21	-	1.68
CRSC	10.50	4.20	1.81	3.20	0.80	0.80	0.81	-	11.62
DIAU	7.00	2.62	1.13	2.00	0.50	0.50	0.51	-	7.26
ELGL	42.00	15.72	81.36	36.40	11.30	65.8	26.66	8.10	245.34
ERFA*	1.40	0.52	0.23	0.40	0.10	0.10	0.10	-	1.45
ERCO	14.00	5.24	2.27	4.00	1.00	1.00	1.01	-	14.52
FRCA	-	-	-	0.60	0.15	0.15	0.15	-	1.05
GAEL	-	-	-	1.60	0.15	0.15	0.15	-	2.05
HO	126.00	47.20	22.65	41.20	10.00	20.00	18.5	8.40	167.95
HOCU	28.00	10.48	9.04	17.80	0.40	-	8.08	-	45.80
SAME	14.00	5.24	2.27	4.00	1.00	1.00	1.01	-	14.52
STPU	-	-	-	22.75	8.00	-	13.3	3.20	47.25
TOTAL	**303.10**	**114.07**	**151.70**	**152.31**	**45.11**	**171.31**	**83.57**	**22.70**	**740.77**

* HMP species

Active restoration was conducted at HA 26 each year from 2018 to 2022. The total number of plants installed at HA 26 was 13,297 compared to 9,845 prescribed in the SSRP. Three distinct areas at HA 26 received active restoration (Figure 9-8). Shrubs installed in Target Areas 2 and 3 received supplemental irrigation throughout the dry season in 2018, 2019, 2020, 2021, and one final irrigation event in early 2022 (see Section 8). Planting amounts by year and species, in comparison to the SSRP target, are presented for each area in Tables 9-24 through 9-26.

Burleson conducted active restoration at HA 26 Target Area 1 in 2019, 2020, 2021, and 2022. The total number of plants installed was 4,896 compared to 3,320 prescribed in the SSRP (Table 9-24).

Table 9-24. Summary of Active Restoration Activities at Target Area 1 for HA 26

Species	Number of Individual Plants					
	SSRP Target Area 1	2019	2020	2021	2022	Total by Species
ACGL	400	-	175	100	59	334
ACMI	200	-	126	55	111	292
ADFA	175	200	134	23	70	427
ARCA	-	50	-	-	-	50
ARHO	-	157	-	-	-	157
ARPU*	175	-	125	151	128	404
ARMO	-	35	-	-	-	35
ARTO	175	40	138	138	-	316
BAPI	75	50	61	30	24	165
CERI*	175	100	125	55	46	326
CRSC	400	-	203	200	85	488
DIAU	350	-	125	125	-	250
ERCO	420	282	100	-	-	407
ERFA*	200	12	100	88	25	200
HOCU	400	125	175	100	-	400
LUAR	-	200	15	-	5	220
SAME	175	300	125	-	-	425
TOTAL	**3,320**	**1,551**	**1,727**	**1,065**	**553**	**4,896**

*HMP Species

Burleson conducted active restoration at HA 26 Target Area 2 in 2018, 2021, and 2022. The total number of plants installed was 5,991 compared to 4,860 prescribed in the SSRP (Table 9-25).

Table 9-25. Summary of Active Restoration Activities at Target Area 2 for HA 26

Species	Number of Individual Plants					
	SSRP Target Area 2	2018 (Jan)	2018 (Dec)	2021	2022	Total by Species
ACGL	580	138	88	-	59	285
ACMI	250	289	-	-	-	289
ADFA	265	589	67	-	25	681
ARPU*	240	644	88	-	-	732
ARTO	265	319	69	-	90	478
BAPI	120	141	31	-	34	206
CERI*	240	290	92	-	80	462
CRSC	550	462	31	-	46	539
DIAU	480	189	153	-	126	468
ERCO	550	50	50	50	101	200
ERFA*	500	360	65	62	50	588
HOCU	580	271	88	75	127	561
LUAR	-	-	15	-	5	20
SAME	240	243	63	50	126	482
TOTAL	**4,860**	**3,985**	**900**	**237**	**869**	**5,991**

* HMP Species

Burleson conducted active restoration at HA 26 Target Area 3 in 2018, 2021, and 2022. The total number of plants installed was 2,410 compared to 1,665 prescribed in the SSRP (Table 9-26).

Table 9-26. Summary of Active Restoration Activities at Target Area 3 for HA 26

Species	Number of Individual Plants				
	SSRP Target Area 3	2018 (Jan)	2021	2022	Total by Species
ACGL	200	57	75	59	191
ACMI	50	125	-	15	140
ADFA	95	134	100	40	274
ARPU*	85	311	-	-	311
ARTO	100	138	-	49	187
BAPI	50	61	31	4	96
CERI*	85	124	75	-	199
CRSC	200	200	-	71	271
DIAU	200	125	-	-	125
ERCO	200	32	50	-	82
ERFA*	100	115	-	26	141
HOCU	200	123	15	50	188
LUAR	-	-	-	5	5
SAME	100	125	75	-	200
TOTAL	**1,665**	**1,670**	**421**	**319**	**2,410**

*HMP Species

9.5.2 Monitoring Results

HA 26 was in year 7 of monitoring in 2022. Year 7 does not require monitoring, however, site visits, plant survivorship surveys and photo documentation were completed (see Appendix D, page D-5).

9.5.2.1 Plant Survivorship

Plant survivorship monitoring was conducted at HA 26 for plants installed in 2018, 2019, 2020, 2021, and 2022. A total of eight shrub species and 711 individual plants were monitored for survivorship. In the 2018, 2019, and 2021 plantings, there were irrigated and non-irrigated plants. In the 2020 and 2022 plantings, all plants were non-irrigated. By year 3 of monitoring, survivorship was 73% for the 2018 planting, 70% for the 2019 planting, and 56% for the 2020 planting. By year 2 of monitoring for the 2021 planting, survivorship was 73%; survivorship decreased from 77% in 2021. By year 1 of monitoring for the 2022 planting, survivorship was 79%. Tables 9-27 through Table 9-31 present results by species.

Table 9-27. Plant Survivorship Monitoring Summary for 2018 Plantings at HA 26

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2018)	Year Two (2019)	Year Three (2020)
			Alive (%)	Alive (%)	Alive (%)
ADFA	723	72	94	91	90
ARPU*	955	92	96	95	96
ARTO	457	46	96	91	91
BAPI	202	18	83	83	84
CERI*	414	41	34	30	25
ERFA*	475	45	42	41	40
SAME	368	34	76	56	47
TOTAL	**3,594**	**348**	**79**	**74**	**73**

* HMP Species

Table 9-28. Plant Survivorship Monitoring Summary for 2019 Plantings at HA 26

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2019)	Year Two (2020)	Year Three (2021)
			Alive (%)	Alive (%)	Alive (%)
ADFA	67	10	90	89	89
ARPU*	88	10	100	100	100
ARTO	69	10	100	100	100
BAPI	31	10	100	100	100
CERI*	92	10	70	70	60
ERFA*	65	10	40	40	33
LUAR	15	9	22	0	0
SAME	63	10	100	90	90
TOTAL	**490**	**79**	**78**	**74**	**70**

* HMP Species

Table 9-29. Plant Survivorship Monitoring Summary for 2020 Plantings at HA 26

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2020)	Year Two (2021)	Year Three (2022)
			Alive (%)	Alive (%)	Alive (%)
ADFA	134	11	92	92	91
ARPU*	125	11	100	92	91
ARTO	138	12	100	86	83
BAPI	61	10	100	70	60
CERI*	125	12	46	33	17
ERFA*	100	10	40	30	30
LUAR	15	10	0	0	0
SAME	125	13	92	77	69
Total	**823**	**89**	**74**	**63**	**56**

* HMP Species

Table 9-30. Plant Survivorship Monitoring Summary for 2021 Plantings at HA 26

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2021)	Year Two (2022)
			Alive (%)	Alive (%)
ADFA	123	11	100	100
ARPU*	151	15	100	100
ARTO	138	14	93	93
BAPI	61	10	90	80
CERI*	130	12	77	58
ERFA*	150	10	40	40
LUAR	15	10	0	0
SAME	125	9	90	89
Total	**893**	**91**	**77**	**73**

* HMP Species

Table 9-31. Plant Survivorship Monitoring Summary for 2022 Plantings at HA 26

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2022)
			Alive (%)
ADFA	135	14	86
ARPU*	128	13	92
ARTO	139	14	93
BAPI	62	9	56
CERI*	126	13	92
ERFA*	101	10	80
LUAR	15	9	0
SAME	126	12	100
Total	**832**	**94**	**79**

* HMP Species

9.5.3 Monitoring Results Discussion

9.5.3.1 Plant Survivorship

Overall plant survivorship was moderate for the 2018, 2019, 2020, and 2021 planting events and high for 2022 planting events at HA 26. For plant survivorship classifications of each species by planting year, see Table 9-32. Low survivorship for yellow bush lupine (*Lupinus arboreus*) and Monterey ceanothus has been seen at multiple sites where plant surviviorship monitoring occurred. HA 26 lacks topsoil and has fine, silty soil which contributes to sheet flow and inhibits water infiltration. Several areas at HA 26 were mulched which prevented erosion and helped with water retention (Kemron, 2018). Survivorship will be monitored for one more year for the 2021 planting and two more years for the 2022 planting.

Table 9-32. Plant Survivorship Classifications for All Planting Years at HA 26

Species	Planting Year				
	2018	2019	2020	2021	2022
ADFA	high	high	high	high	high
ARPU*	high	high	high	high	high
ARTO	high	high	high	high	high
BAPI	high	high	moderate	high	moderate
CERI*	low	moderate	low	moderate	high
ERFA*	low	low	low	low	high
LUAR	-	low	low	low	low
SAME	low	high	moderate	high	high

* HMP Species

9.5.4 HA Status Discussion

HA 26 was in year 7 of monitoring in 2022; the only monitoring that occurred was plant survivorship, site visits, and photo documentation. In 2020, year 5 of monitoring, the site met three of six success criteria (see Table 9-33).

Per previous recommendations, an irrigation system was installed in 2018 and there was a focused effort to irrigate HMP shrubs to improve survivorship and HMP shrub cover (Burleson, 2019). The Army has no further recommendations at this time. Overall, the site needs more time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-5).

HA 26 will continue to be monitored by photo documentation, species richness meandering transects, vegetative cover line-intercept transects, and HMP annual density in year 8, 2023 (see Table 9-21).

Table 9-33. Status for Achieving Success Criteria at HA 26

Success Criterion	Category	Acceptable Limits	Year 5 (2020) Met	Recommendations	Notes
Objective 1 – No. 1	Species richness	7 required species: ADFA, ARPU, ARTO, CERI, ERFA, DIAU, SAME	Yes	None	**Year 5**: met
Objective 1 – No. 2	Native vegetation cover	≥ 20%	No	None, reassess at year 8	**Year 5**: 17.88%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	None	**Year 5**: 0.15%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	No	None, reassess at year 8	**Year 5**: 2.16%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 2% CERI = present ERFA = present	No	None, reassess at year 8	**Year 5**: ARPU 1.54% CERI 0.56% ERFA 0.06%
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	None	**Year 5**: met

9.6 HA 27

HA 27 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010; 100 cubic yards of lead-contaminated soil was excavated from 0.06 acres (Shaw, 2008). HA 27 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 27 is relatively flat and sits on exposed bedrock with surface water runoff in its western portion. Adjacent lands were not developed and contain intact native vegetation that may promote natural recruitment within restoration areas.

HA 27 is located on the southern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 27 consisted of hand-broadcast non-irrigated seed and annual weed management activities.

Restoration at HA 27 occurred in 2011, 2012, 2019, 2020, and 2022 and quantitative monitoring began in 2016. HA 27 was monitored for 12 years by photo documentation and site visits and four years for species richness and vegetative cover (see Table 9-34). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-9 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 27 are summarized in Table 9-35.

Table 9-34. Historic Summary of Restoration and Monitoring Activities at HA 27

Activity	Monitoring Years													
			1	2	3	4	5	6	7	8	9	10	11	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2025
Restoration: Active and Passive	●	●							●	●		●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Species Richness						●	●	●		●				●
Vegetative Cover						●†	●	●		●				●

† Vegetative cover was monitored using quadrats in 2016

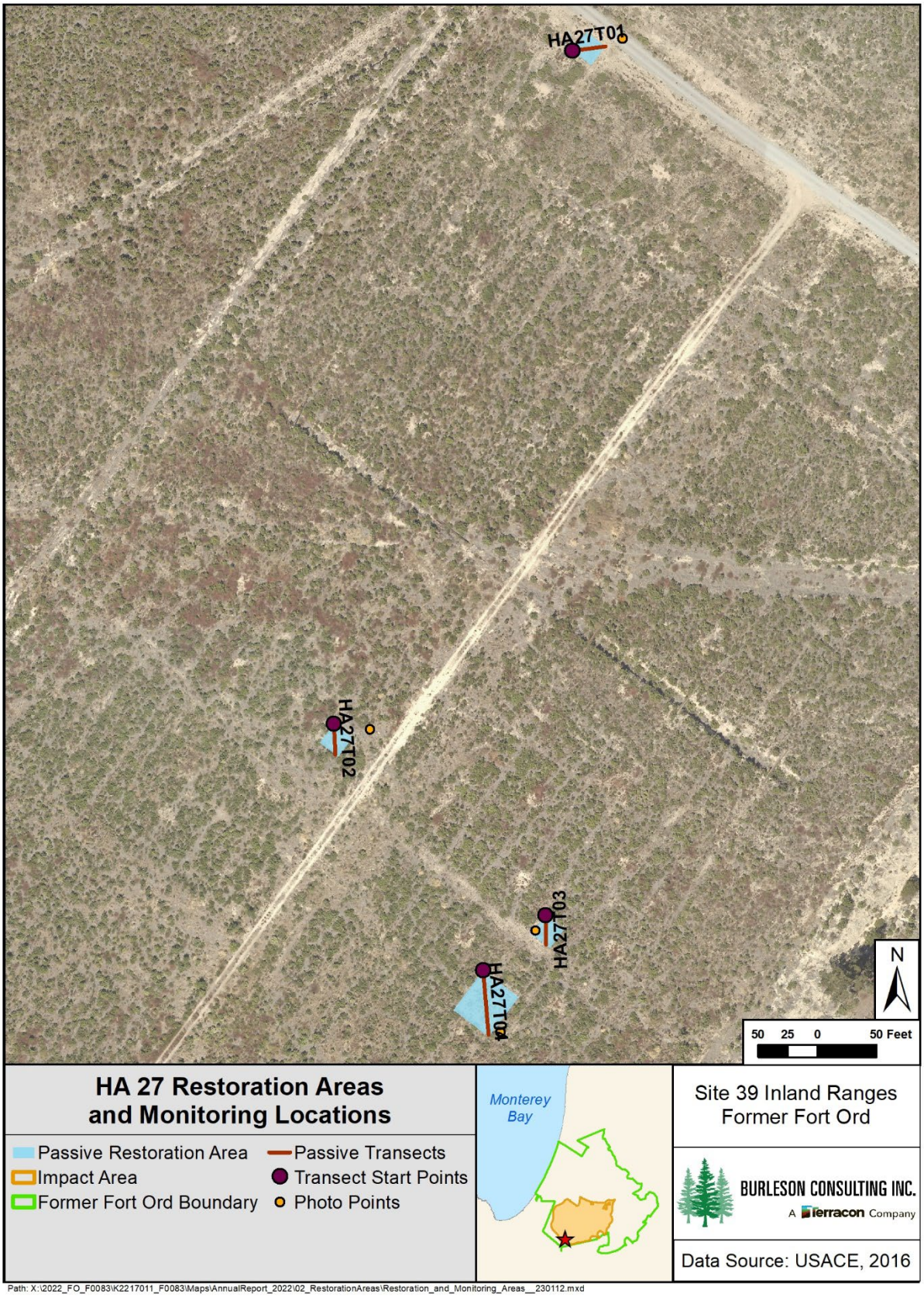


Figure 9-9. HA 27 Restoration Areas and Monitoring Locations Map

Table 9-35. Success Criteria and Acceptable Limits for Restoration of HA 27

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			Monterey manzanita† shaggy-bark manzanita sandmat manzanita† coyote brush Monterey ceanothus† golden yarrow peak rush-rose wedge-leaved horkelia deerweed sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species jubata grass at 50 percent cover. Therefore, the non-native target weed may be present at less than or equal to 5 percent.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4 (26-50% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 25.
			Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1.

Table 9-35. Success Criteria and Acceptable Limits for Restoration of HA 27

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.6.1 Restoration Activities

Burleson performed passive restoration at HA 27 in 2011, 2012, 2019, and 2020. The total amount of seed broadcast on site was 3.44 lb compared to the 1.27 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities and to address the native vegetation cover success criterion. Table 9-36 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-36. Summary of Passive Restoration Activities for HA 27

Species	Pounds of Seed Broadcast					
	SSRP Target	2011	2012	2019	2020	Total by Species
ACGL	0.12	0.06	0.06	-	0.40	0.52
ACMI	-	-	-	0.15	0.40	0.55
ARMO*	0.06	0.03	0.04	-	-	0.07
ARPU*	0.12	0.06	0.07	-	-	0.13
ARTO	0.12	0.06	0.07	-	-	0.13
BAPI	0.01	-	0.01	-	-	0.01
CERI*	0.06	-	0.06	-	-	0.06
CRSC	0.06	0.03	0.03	-	-	0.06
ELGL	-	-	-	0.40	0.60	1.00
HOCU	0.12	0.06	0.06	0.20	-	0.32
HO	0.54	-	0.27	-	-	0.27
SAME	0.06	0.04	0.03	-	-	0.07
STPU	-	-	-	0.25	-	0.25
TOTAL	**1.27**	**0.34**	**0.70**	**1.00**	**1.40**	**3.44**

* HMP species

No active restoration was prescribed at HA 27; however, AMP planting events occurred in 2019, 2022, and 2023 per recommendations made in the 2018 and 2019 Annual Reports (Burleson, 2019; Burleson, 2020). A total of 89 plants were installed at HA 27 for these planting events. Table 9-37 summarizes the plants installed during active restoration.

Table 9-37. Summary of Active Restoration Activities for HA 27

Species	Number of Individual Plants			
	2019	2022	2023	Total by Species
ARMO*	20	-	-	20
ARPU*	-	25	20	45
DIAU	14	-	-	14
ERCO	10	-	-	10
TOTAL	**44**	**25**	**20**	**89**

*HMP species

9.6.2 Monitoring Results

HA 27 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-6).

9.6.3 HA Status Discussion

In 2017, year 5 of monitoring, HA 27 met one of five success criteria. In 2020, year 8 of monitoring, the site met two of five success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 27 has a low chance of meeting the absolute HMP shrub cover criteria. For the HMP cover by species criterion, there is a low chance of meeting the requirement for sandmat manzanita cover, but a high chance that Monterey manzanita and Monterey ceanothus will meet the required cover, which were both met in year 8 (see Table 9-38).

Per recommendations in the 2016 Annual Report, Monterey manzanita, golden yarrow, and sticky monkeyflower were planted in the 2018/2019 season to support native vegetation cover and HMP shrub cover criteria (Burleson, 2017). Additionally, the Army planted sandmat manzanita in the 2021/2022 and 2022/2023 planting season to support the HMP shrub cover success criteria. The Army has no further recommendations at this time. HA 27 was last monitored in 2020 and AMP planting occurred in the 2021/2022 and 2022/2023 wet seasons. The site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-6).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-34).

Table 9-38. Status for Achieving Success Criteria at HA 27

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	11 Required species: ARMO, ARTO, ARPU, BAPI, CERI, ERCO, CRSC, HOCU, ACGL, DIAU, SAME	No	Yes	HIGH	**Year 5**: ERCO absent **Year 8**: met (ERCO planted in 2018/2019)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	HIGH	**Year 5**: 32.69% **Year 8**: 34.48% (AMP planting occurred in 2018/2019, 2021/2022, and 2022/2023)
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 1.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 4: 26-50%	No	No	LOW	**Year 5**: 0.00% **Year 8**: 6.60% (AMP planting occurred in 2018/2019, 2021/2022, and 2022/2023)
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 25% ARMO ≥ 2% CERI ≥ 1%	No	No	LOW for ARPU HIGH for ARMO HIGH for CERI	**Year 5**: ARPU 0.00% ARMO 0.00% CERI 0.00% **Year 8**: ARPU 0.00% ARMO 2.19% CERI 4.40% (ARMO planted in 2018/2019, ARPU planted in 2021/2022 and 2022/2023)
Objective 3 – No. 4	HMP annual density	NA	NA	NA	NA	No HMP annuals in baseline data

9.7 HA 27A

HA 27A was used by the Army as a small-arms firing range. Soil remediation was completed in 2010; 1,100 cubic yards of lead-contaminated soil were excavated from 0.6 acres (Shaw, 2008). HA 27A rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 27A is relatively flat with a west aspect. Adjacent lands were not developed and contain intact native vegetation that may promote natural recruitment within restoration areas.

HA 27A is made up of three distinct polygons that are located on the southern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In the southern most polygon, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 27A consisted of hand broadcast non-irrigated seed and annual weed management activities. The southern polygon at HA 27A lacks topsoil, has exposed hardpan sandstone, and ongoing erosion issues. This area is a transitional vegetative zone between maritime chaparral and grassland.

In 2019, the success criteria for HA 27A was revised due to the marginal response to restoration efforts. Under the revised success criteria, the southern polygon (HA 27A South) will resemble the early successional stages of a maritime chaparral habitat and the existing success criteria will continue to be applied to the two northern polygons (HA 27A North) (USFWS, 2019). HA 27A North and South are now evaluated separately for the species richness and non-native target weed cover success criteria. HA 27A North is the only area of the site to be evaluated for native vegetation cover, HMP shrub cover, and HMP shrub cover by species criteria.

Restoration at HA 27A occurred in 2011, 2012, 2016, 2018, 2019, 2020, 2021, and 2022 and quantitative monitoring began in 2016. HA 27A was monitored for 12 years by photo documentation and site visits and four years for species richness and vegetative cover (see Table 9-39). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-10 shows the HA footprint, passive restoration area, and transect locations. Success criteria for HA 27A are summarized in Table 9-40.

Table 9-39. Historic Summary of Restoration and Monitoring Activities at HA 27A

Activity	Monitoring Years												
			1	2	3	4	5	6	7	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025
Restoration: Passive and Erosion Control	●	●				●		●	●	●	●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Species Richness						●	●	●		●			●
Vegetative Cover						●	●	●		●			●

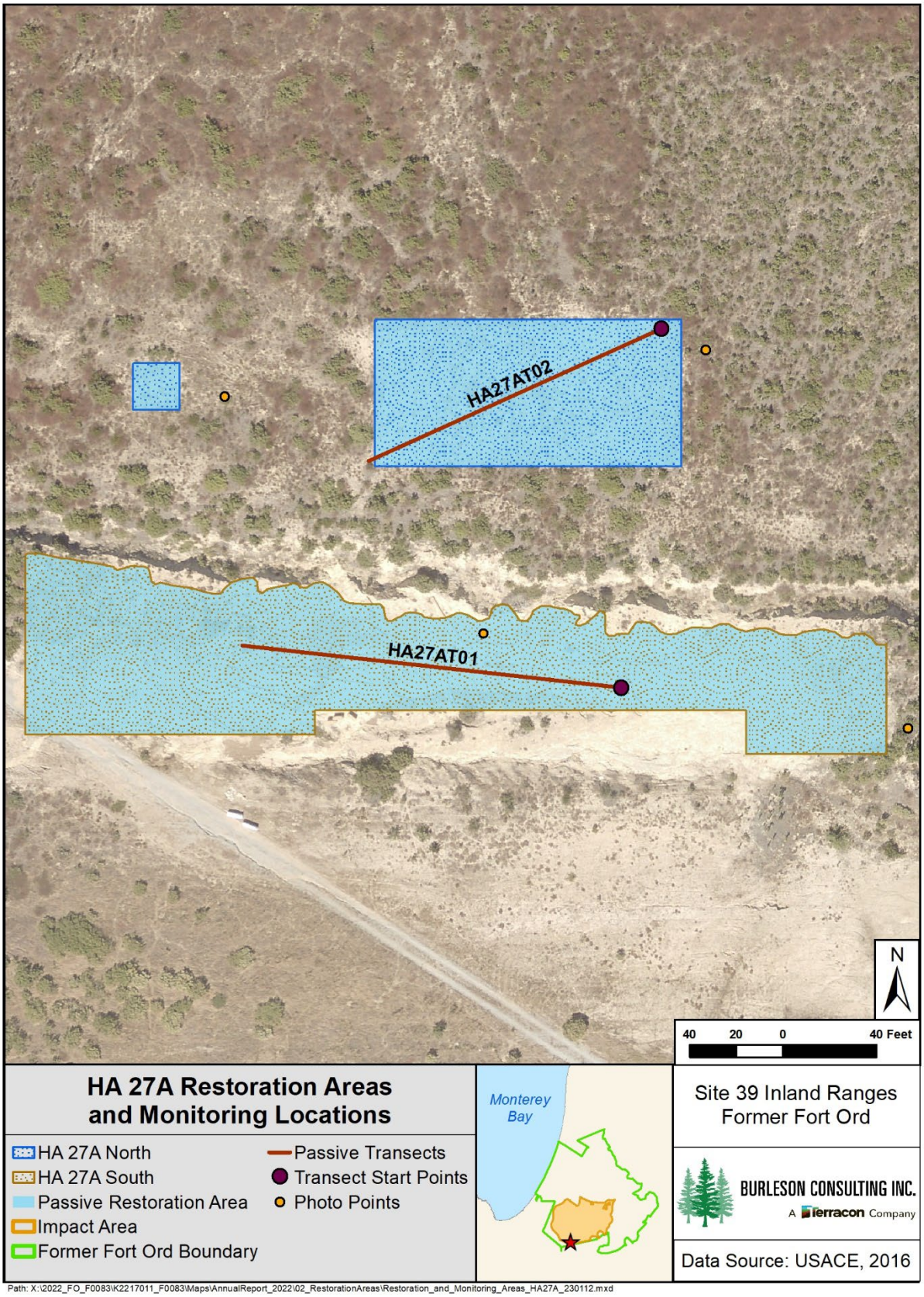


Figure 9-10. HA 27A Restoration Areas and Monitoring Location Map

Table 9-40. Success Criteria and Acceptable Limits for Restoration of HA 27A North

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise Monterey manzanita† shaggy-bark manzanita sandmat manzanita† coyote brush Monterey ceanothus† golden yarrow peak rush-rose wedge-leaved horkelia deerweed sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species jubata grass at 10 percent cover. Therefore, the non-native target weed may be present at less than or equal to 5 percent.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4 (26-50% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 25.
			Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1.

Table 9-40. Success Criteria and Acceptable Limits for Restoration of HA 27A North

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

Table 9-41. Success Criteria and Acceptable Limits for Restoration of HA 27A South‡

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness: coyote brush peak rush-rose wedge-leaved horkelia deerweed sticky monkeyflower
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species jubata grass at 10 percent cover. Therefore, the non-native target weed may be present at less than or equal to 5 percent.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity (North only)	HMP shrub cover class must meet or exceed baseline data	Cover class: Not applicable
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Not applicable
	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable

* Objectives presented in HRP (Shaw, 2009b)
‡ Success criteria for HA 27A South updated by USFWS (USFWS, 2019)

9.7.1 Restoration Activities

Burleson performed passive restoration in 2011, 2012, 2016, 2018, 2019, 2020, and 2022 throughout HA 27A North and South. The total amount of seed broadcast on site was 66.306 lb compared to 13.530 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-42 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-42. Summary of Passive Restoration Activities for HA 27A

Species	Pounds of Seed Broadcast								
	SSRP Target	2011	2012	2016	2018	2019 (Feb - March)	2020	2022	Total by Species
ACGL	1.200	0.600	0.608	0.800	-	-	2.000	0.400	4.408
ACMI	-	-	-	0.400	0.750	0.600	2.000	0.200	3.950
ADFA	0.600	0.300	0.308	-	-	-			0.608
ARMO*	1.200	0.600	0.611	-	-	-			1.211
ARPU*	0.600	0.300	0.308	-	-	-			0.608
ARTO	1.200	0.600	0.612	-	-	-			1.212
BAPI	0.090	-	0.046	-	-	-			0.046
CERI*	0.600	-	0.314	-	-	-			0.314
CRSC	0.600	0.300	0.303	-	-	-			0.603
DIAU	0.060	0.200	0.183	-	-	-			0.383
ELGL	-	-	-	14.400	2.000	1.600		1.300	19.300
ERCO	0.180	0.093	0.093	-	-	-			0.186
HOCU	1.200	0.600	0.600	11.400	1.000	0.800			14.400
HO	5.400	-	5.421	2.000	-	-		1.200	8.621
SAME	0.600	0.300	0.306	-	-	-			0.606
STPU	-	-	-	7.000	1.250	1.000		0.600	9.850
TOTAL	**13.530**	**3.893**	**9.713**	**36.000**	**5.000**	**4.000**	**4.000**	**3.700**	**66.306**

* HMP Species

No active restoration was prescribed at HA 27A; however, AMP planting events were conducted in 2021 and 2022 per recommendations made in the 2017 Annual Report (Burleson, 2018). The total number of plants installed at HA 27A North and South was 525. Planting amounts by year and species are presented for each area in Tables Table 9-43 and 9-44.

AMP planting events occurred at HA 27A North in 2021 and 2022 and a total of 225 plants were installed (Table 9-43).

Table 9-43. Summary of Active Restoration Activities for HA 27A North

Species	Number of Individual Plants		
	2021	2022	Total by Species
ARPU*	160	-	160
ARMO*	-	25	25
CERI*	40	-	40
TOTAL	**200**	**25**	**225**

*HMP species

An AMP planting event occurred at HA 27A South in 2021 and a total of 300 plants were installed (Table 9-44).

Table 9-44. Summary of Active Restoration Activities for HA 27A South

Species	Number of Individual Plants	
	2021	Total by Species
ACGL	100	100
BAPI	100	100
STPU	100	100
TOTAL	**300**	**300**

*HMP species

9.7.2 HA 27A North Monitoring Results

HA 27A North was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-7).

9.7.3 HA 27A North Status Discussion

In 2017, year 5 of monitoring, HA 27A met two of five success criteria before it was split into two sites. In 2020, year 8 of monitoring, HA 27A North met two of five success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 27A North has a low chance of meeting the success criteria for absolute HMP shrub cover and HMP shrub cover by species (see Table 9-45).

Per recommendations in the 2017 Annual Report, the Army implemented two actions to support HA 27A North in achieving success criteria in future years: 1) plant sandmat manzanita, Monterey manzanita, and Monterey ceanothus to support HMP shrub criteria (sandmat manzanita and Monterey ceanothus were planted in the 2020/2021 season and Monterey manzanita was planted in the 2021/2022 season), and 2) manage the site in two distinct areas and reevaluate the success criteria for the southern polygon (Burleson, 2018). HA 27A North is the only area of the site to be evaluated for native vegetation cover, HMP shrub cover, and HMP shrub cover by species criteria. The updated success criteria are reflected in Tables 9-40 and Table 9-45. The Army has no further recommendations at this time. HA 27A North was last monitored in 2020 and AMP planting occurred in the 2020/2021 and 2021/2022 wet seasons. The site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-7).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-39).

Table 9-45. Status for Achieving Success Criteria at HA 27A North

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met*	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	12 Required species: ADFA, ARMO, ARTO, ARPU, BAPI, CERI, ERCO, CRSC, HOCU, ACGL, DIAU, SAME	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	High	**Year 5**: 23.34%, **Year 8**: 33.18%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	High	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 4: 26-50%	No	No	LOW	**Year 5**: 0.62% **Year 8**: 2.80% (ARPU and CERI planted in 2020/2021, ARMO planted in 2021/2022)
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 25% ARMO ≥ 2% CERI ≥ 1%	No	No	LOW for ARPU LOW for ARMO LOW for CERI	**Year 5**: ARPU 0.62% ARMO 0.00% CERI 0.00% **Year 8**: ARPU 2.20% ARMO 0.59% CERI 0.00% (ARPU and CERI planted in 2020/2021, ARMO planted in 2021/2022)
Objective 3 – No. 4	HMP annual density	NA	NA	NA	NA	NA

*Prior to HA 27A being split into distinct North and South sections for monitoring purposes

9.7.4 HA 27A South Monitoring Results

HA 27A South was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-8).

9.7.5 HA 27A South Status Discussion

In 2017, year 5 of monitoring, HA 27A met two of five success criteria before it was split into two sites. In year 8, HA 27A South met both relevant success criteria. The site is on trajectory to continue meeting both success criteria by year 13 of monitoring, 2025 (see Table 9-46).

Per recommendations in the 2017 Annual Report, the Army implemented two actions to support HA 27A South in achieving success criteria in future years: 1) continue erosion control efforts, including the use of mulch (Kemron applied mulch to the eastern portion of the polygon in 2018) and 2) manage the site in two distinct areas and reevaluate the success criteria for the southern polygon (Burleson, 2018). HA 27A South is now evaluated only for species richness and non-native target weed cover with the goal of resembling the early successional stages of a maritime chaparral habitat. The Army planted deerweed, coyote brush, and purple needlegrass in the 2020/2021 season to support these goals. The updated success criteria are reflected in Tables 9-41 and 9-46. The Army has no further recommendations at this time. A qualitative overview was documented by photo points (see Appendix D, page D-8).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-39).

Table 9-46. Status for Achieving Success Criteria at HA 27A South

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met*	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	12 Required species: ADFA, ARMO, ARTO, ARPU, BAPI, CERI, ERCO, CRSC, HOCU, ACGL, DIAU, SAME	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	NA	NA	NA	NA	NA
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	YES	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	NA	NA	NA	NA	NA
Objective 3 – No. 4	HMP shrub cover by species	NA	NA	NA	NA	NA
Objective 3 – No. 4	HMP annual density	NA	NA	NA	NA	NA

*Prior to HA 27A being split into distinct North and South sections for monitoring purposes

9.8 HA 28

HA 28 was used by the Army as a range for automatic rifles. Soil was excavated over 4.3 acres. A vernal pool comprised ponds 30A, 30B, and 30C and partially extends into HA 28. California tiger salamander (*Ambystoma californiense*) and other aquatic species have been documented within the vernal pool. HA 28 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 28 is surrounded by medium to very high-quality habitat.

HA 28 is located on the southern portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 28 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and installing native container-grown plants. HA 28 is moderately sloped with some potential for erosion.

Restoration activities at HA 28 occurred from 2013 to 2020 and quantitative monitoring began in 2015. The HA was monitored for 10 years by photo documentation and site visits; six years for HMP annual density in plots; seven years for plant survivorship; and five years for HMP annual density across the HA, species richness, and vegetative cover (see Table 9-47). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-11 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. Success criteria for HA 28 are summarized in Table 9-48.

Table 9-47. Historic Summary of Restoration and Monitoring Activities at HA 28

Activity	Monitoring Years										
			1	2	3	4	5	6	7	8	13
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2027
Restoration: Active, Passive, and Erosion Control	●	●	●	●	●	●	●	●			
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●			●	
HMP Annual Density across HA				●	●	●	●			●	
Species Richness				●	●	●	●			●	●
Vegetative Cover				●	●	●	●			●	●
Plant Survivorship			●	●	●	●	●	●	●		

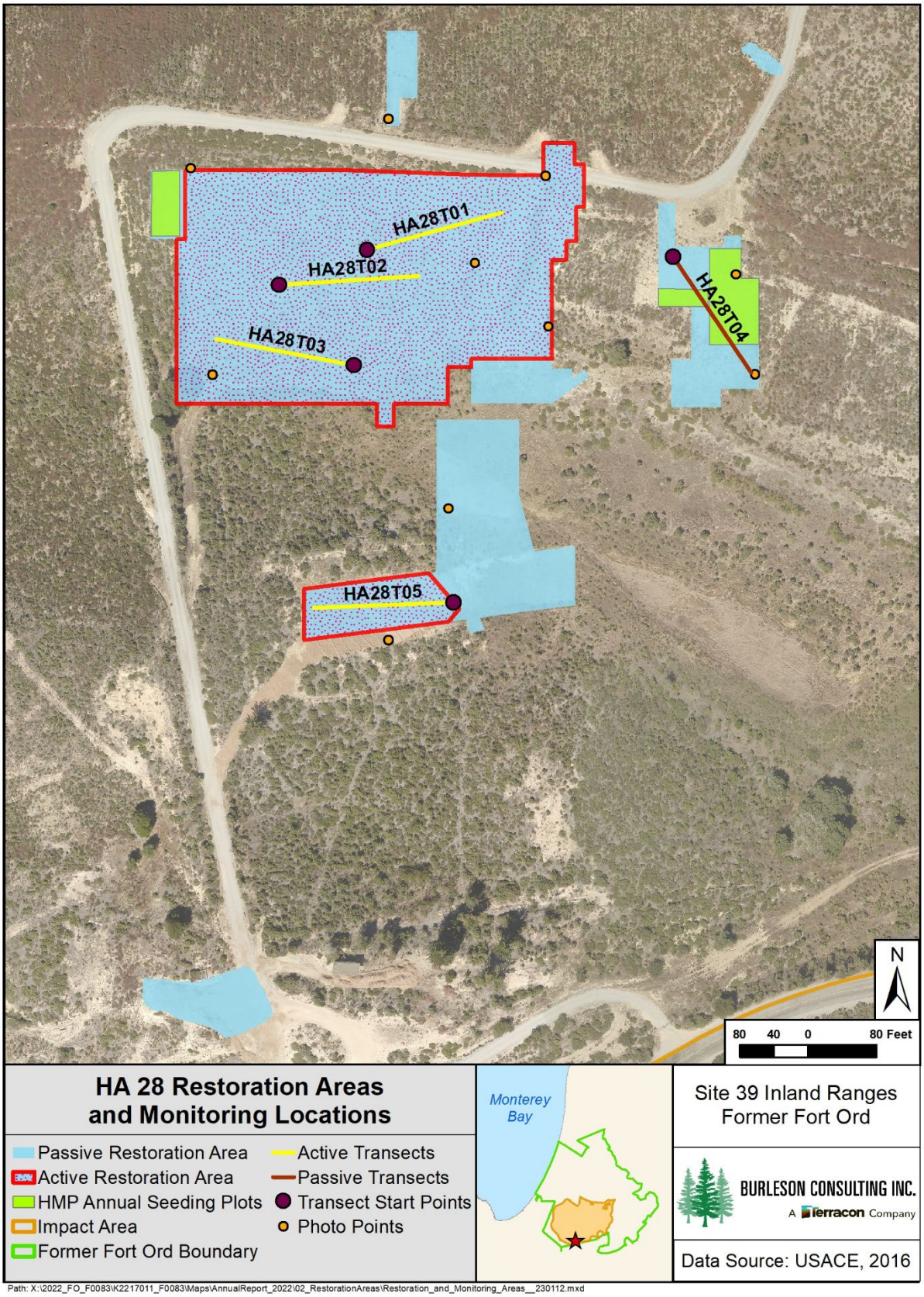


Figure 9-11. HA 28 Restoration Areas and Monitoring Locations Map

Table 9-48. Success Criteria and Acceptable Limits for Restoration of HA 28

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise Monterey manzanita† sandmat manzanita† shaggy-bark manzanita Monterey ceanothus† wedge-leaved horkelia black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated presence of non-native target weed species jubata grass. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 35.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 1 percent is acceptable.
			Monterey manzanita percent cover, as an average of transect data, must be present however, less than 2 percent is acceptable.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

9.8.1 Restoration Activities

Burleson performed passive restoration at HA 28 in 2013, 2014, 2015, 2016, 2017, 2018, 2019, and 2020. The total amount of seed broadcast on site was 328.80 lb compared to 115.80 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-49 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower in 2014 and 2017. Three plots were chosen in the HA based on having suitable habitat for Monterey spineflower and adjacent extant populations (see Figure 9-11).

Table 9-49. Summary of Passive Restoration Activities for HA 28

Species	Pounds of Seed Broadcast									
	SSRP Target	2013	2014	2015	2016	2017	2018	2019	2020	Total by Species
ACMI	3.40	4.40	-	3.14	-	-	2.10	0.30	17.20	27.14
ACGL	6.80	8.50	-	3.72	-	-	-	-	18.40	30.62
BAPI	0.50	1.00	-	0.07	-	-	-	-	-	1.07
CERI*	1.70	1.70	-	0.36	-	-	-	-	-	2.06
CHPUP*	0.10	-	0.03	-	-	0.03	-	-	-	0.06
CRSC	2.60	3.50	-	0.29	-	-	-	-	-	3.79
DIAU	0.50	3.60	-	0.18	-	-	-	-	-	3.78
ELGL	13.6	33.60	-	15.70	1.20	-	5.60	0.80	3.00	59.9
ERCO	4.30	5.30	-	0.36	-	-	-	-	-	5.66
ERER	-	3.10	-	-	-	-	-	-	-	3.1
ERFA*	0.70	0.70	-	0.04	-	-	-	-	-	0.74
HO	68.0	118.00	-	36.40	0.80	-	10.00	-	-	165.2
HOCU	6.80	8.80	-	0.72	-	-	2.80	0.40	-	12.72
SAME	6.80	7.70	-	0.36	-	-	-	-	-	8.06
STPU	-	-	-	-	-	-	3.50	0.50	0.90	4.9
TOTAL	**115.80**	**199.90**	**0.03**	**61.34**	**2.00**	**0.03**	**24.00**	**2.00**	**39.50**	**328.80**

* HMP species

Active restoration was conducted in 2015, 2018, and 2019. The total number of plants installed at HA 28 was 4,968 compared to 4,382 prescribed in the SSRP (Table 9-50).

Table 9-50. Summary of Active Restoration Activities for HA 28

Species	Number of Individual Plants				
	SSRP Target	2015	2018	2019	Total by Species
ACGL	237	237	-	20	257
ADFA	473	473	-	60	533
ARCA	-	-	-	75	75
ARHO*	237	237	-	45	282
ARMO*	237	237	-	71	308
ARPU*	947	-	948	44	992
ARTO	592	592	-	-	592
BAPI	237	237	-	105	342
CERI*	237	375	-	30	405
CRSC	237	237	-	10	247
ERCO	237	175	-	10	185
ERFA*	237	161	-	40	201
FRCA	-	-	-	40	40
HOCU	237	237	-	5	242
SAME	237	237	-	30	267
TOTAL	**4,382**	**3,435**	**948**	**585**	**4,968**

* HMP species

9.8.2 Monitoring Results

9.8.2.1 HMP Annual Density

Monterey spineflower restoration plots were monitored for density at HA 28 in 2022.

Three Monterey spineflower restoration plots were monitored for year 8 density at HA 28 in 2022. The plots are numbered 1-3 on Figure 9-13 and are located throughout HA 28. Monterey spineflower density was low at Plot 1 and 2 and not present at Plot 3. Figure 9-12 represents Monterey spineflower restoration plot densities for HA 28.

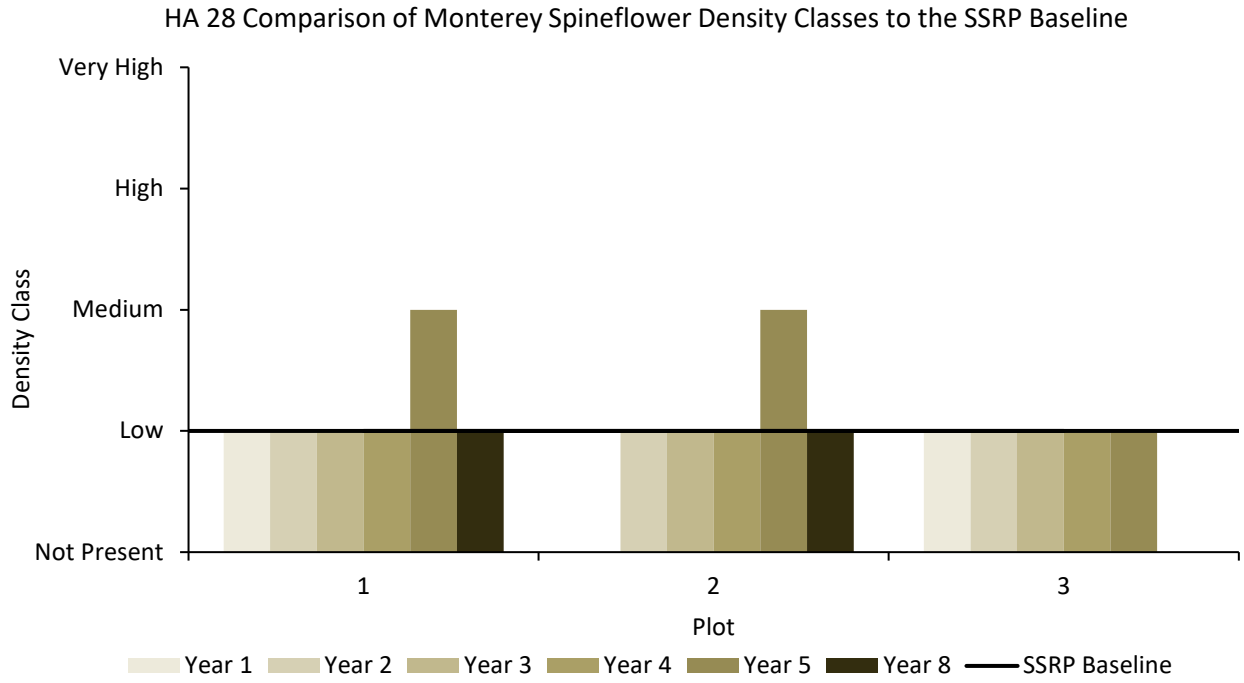


Figure 9-12. HA 28 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-3

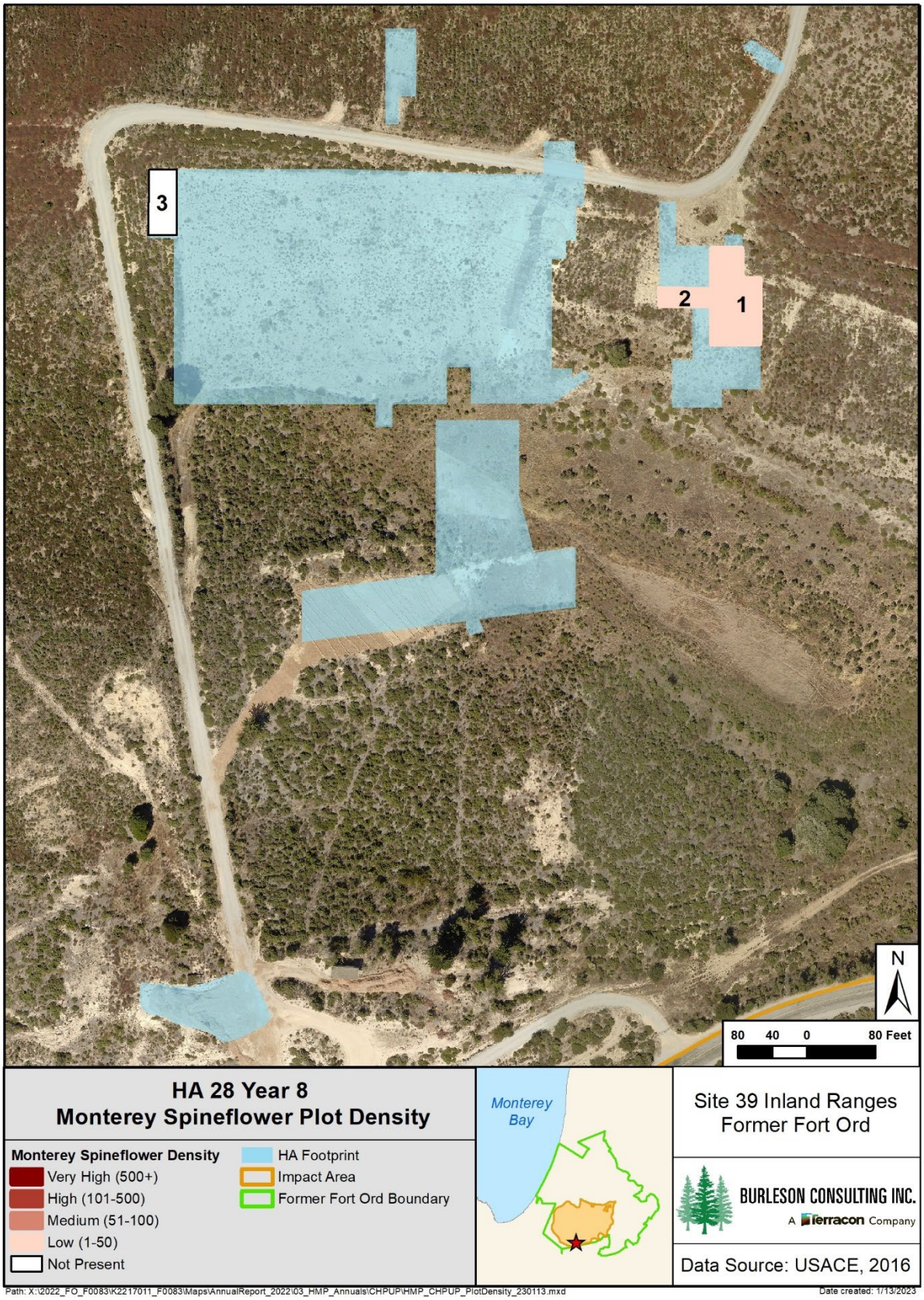


Figure 9-13. HA 28 Year 8 Monterey Spineflower Plot Density Map

HMP annual density monitoring includes mapping discrete patches of HMP annuals within the restoration site but outside of the HMP annual restoration plots. This survey was completed for Monterey spineflower at HA 28.

Twenty-three individual plants of Monterey spineflower were counted and mapped (see Figure 9-14). Densities and acerages were not calculated because no discrete patches were observed. From 2019 to 2022, the density range and acreage above the SSRP baseline decreased.

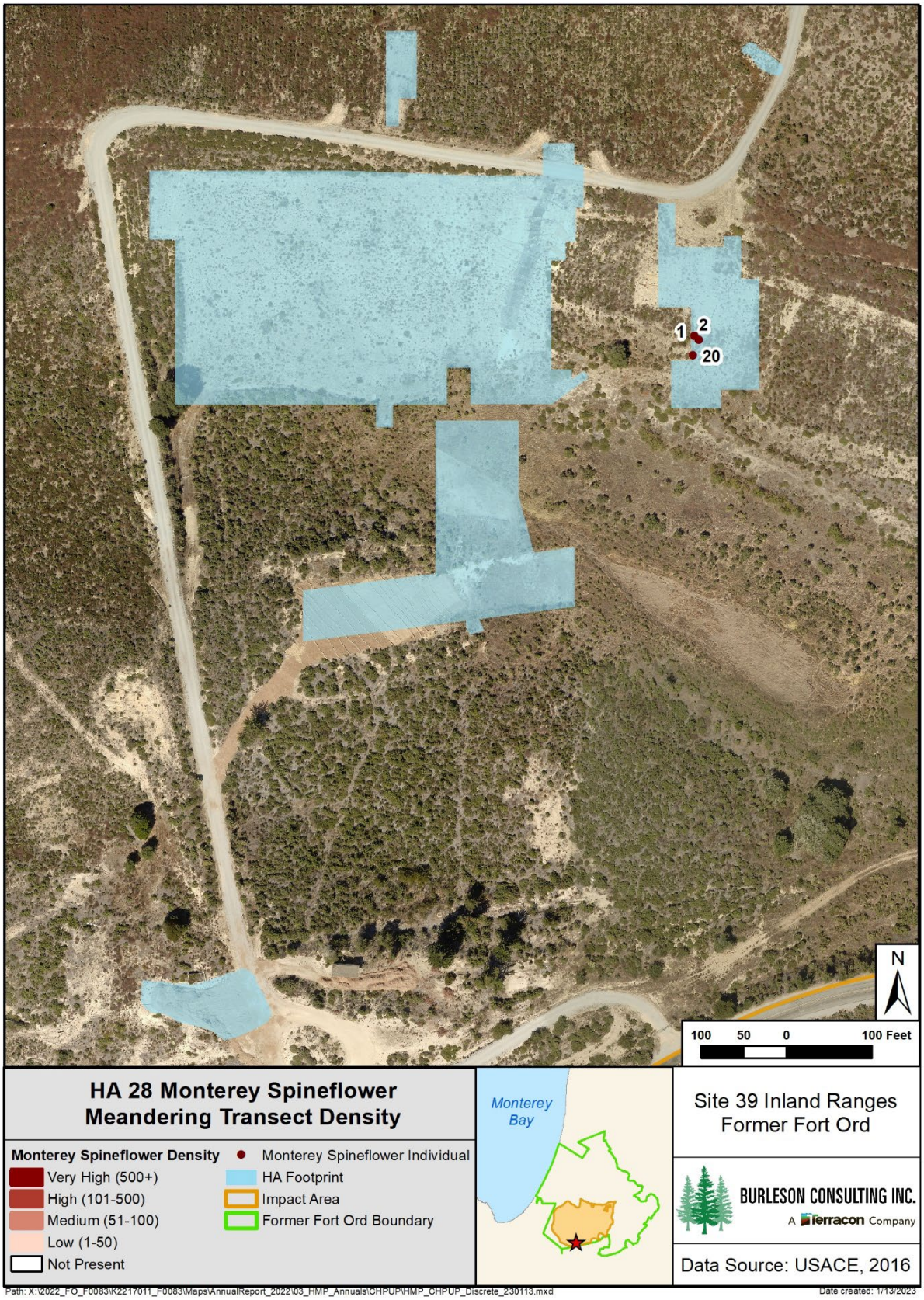


Figure 9-14. HA 28 Year 8 Monterey Spineflower Meandering Transect Density Map

9.8.2.2 Species Richness

One hundred thirteen species were observed at HA 28. Of those, 54 were native shrubs or perennials, 26 were native annual herbaceous species, and 33 were non-native species (see Table 9-51). Species richness increased by five species since 2019. Native shrub and perennial species richness increased by four, native herbaceous species richness decreased by five, non-native species richness increased by seven, and uncategorized species richness decreased by one. Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of species richness and comparison to the success criteria (see section 6.1.4).

Table 9-51. Species Observed on HA 28, 2022

Scientific Names	Common Names	Code	Category
Acacia sp.	acacia	AC	NNP
Achillea millefolium	common yarrow	ACMI	NP
Acmispon americanus var. *americanus*	Spanish clover	ACAMA	NF
Acmispon glaber	deerweed	ACGL	NP
Acmispon heermannii var. *orbicularis*	Heermann's lotus	ACHEO	NP
Acmispon parviflorus	hill lotus	ACPA	NF
Acmispon strigosus	Bishop's lotus	ACST	NF
Adenostoma fasciculatum	chamise	ADFA	NP
Agrostis avenacea	Pacific bent grass	AGAV	NNP
Agrostis exarata	spike bent grass	AGEX	NP
Aira caryophyllea	silver hair grass	AICA	NNF
*Arctostaphylos hookeri**	Hooker's manzanita	ARHO	NP
*Arctostaphylos montereyensis**	Monterey manzanita	ARMO	NP
*Arctostaphylos pumila**	sandmat manzanita	ARPU	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Artemisia californica	California sagebrush	ARCA	NP
Artemisia douglasiana	mugwort	ARDO	NP
Avena barbata	slender wild oat	AVBA	NNF
Baccharis glutinosa	salt marsh baccharis	BAGL	NP
Baccharis pilularis	coyote brush	BAPI	NP
Bowlesia incana	hoary bowlesia	BOIN3	NF
Briza minor	small quaking grass	BRMI	NNF
Bromus carinatus	California brome	BRCA	NF
Bromus diandrus	ripgut brome	BRDI	NNF
Bromus hordeaceus	soft chess	BRHO	NNF
Bromus madritensis ssp. *rubens*	foxtail chess	BRMAR	NNF
Carex barbarae	Santa Barbara sedge	CABA	NP
Carex tumulicola	foothill sedge	CATU	NP
Carpobrotus edulis	hottentot fig	CAED	NNP
Castilleja densiflora	owl's clover	CADE	NF
Castilleja foliolosa	woolly indian paintbrush	CAFO2	NP
Ceanothus dentatus	dwarf ceanothus	CEDE	NP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Centaurea melitensis	tocalote	CEME	NNF
Chorizanthe diffusa	diffuse spineflower	CHDI	NF
Chorizanthe pungens var. *pungens**	Monterey spineflower	CHPUP	NF
Cordylanthus rigidus ssp. *littoralis**	seaside bird's-beak	CORIL	NF
Corethrogyne filaginifolia	common sandaster	COFI	NP

Table 9-51. Species Observed on HA 28, 2022

Scientific Names	Common Names	Code	Category
Cortaderia jubata	jubata grass	COJU	NNP
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Cryptantha clevelandii	Cleveland's cryptantha	CRCL	NF
Cyperus eragrostis	tall cyperus	CYER	NP
Deinandra corymbosa	coastal tarweed	DECO	NF
Diplacus aurantiacus	sticky monkeyflower	DIAU	NP
Distichlis spicata	salt grass	DISP	NP
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	NP
Eleocharis acicularis	needle spikerush	ELAC	NP
Eleocharis macrostachya	spike rush	ELMA	NP
Elymus glaucus	blue wild-rye	ELGL	NP
Epilobium ciliatum	fringed willowherb	EPCI	NF
Ericameria ericoides	mock heather	ERER	NP
*Ericameria fasciculata**	Eastwood's goldenbush	ERFA	NP
Erigeron canadensis	horseweed	ERCA	NF
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium botrys	long-beaked filaree	ERBO	NNF
Festuca bromoides	brome fescue	FEBR	NNF
Festuca myuros	rattail sixweeks grass	FEMY	NNF
Frangula californica	California coffeeberry	FRCA	NP
Gamochaeta ustulata	purple cudweed	GAUS	NP
Gastridium phleoides	nit grass	GAPH	NNF
Geranium dissectum	cut-leaved geranium	GEDI	NNF
Heliotropium curassavicum var. *oculatum*	seaside heliotrope	HECUO	NP
Hesperocyparis macrocarpa	Monterey cypress	HEMA22	NP
Heteromeles arbutifolia	toyon	HEAR	NP
Heterotheca grandiflora	telegraph weed	HEGR	NF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Hypochaeris glabra	smooth cat's ear	HYGL	NNF
Hypochaeris radicata	rough cat's ear	HYRA	NNP
Juncus balticus ssp. *ater*	baltic rush	JUBAA	NP
Juncus patens	spreading rush	JUPA	NP
Juncus phaeocephalus	brown-headed rush	JUPH	NP
Lasthenia glaberrima	smooth goldfields	LAGL3	NF
Lessingia pectinata	common lessingia	LEPE	NF
Logfia gallica	daggerleaf cottonrose	LOGA	NNF
Lomatium parvifolium	coastal biscuitroot	LOPA	NP
Lupinus chamissonis/albifrons	silver bush lupine	LUCH/LUAL	NP
Lupinus truncatus	Nuttall's annual lupine	LUTR	NF
Lysimachia arvensis	scarlet pimpernel	LYAR	NNF
Lythrum hyssopifolia	grass poly	LYHY	NNF
Madia exigua	little tarweed	MAEX	NF
Madia sativa	coast tarweed	MASA	NF
Morella californica	wax myrtle	MOCA6	NP
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP	NF
Navarretia mellita	skunk navarretia	NAME	NF
Pentagramma triangularis	gold back fern	PETR	NP
Petrorhagia dubia	hairypink	PEDU	NNF

Table 9-51. Species Observed on HA 28, 2022

Scientific Names	Common Names	Code	Category
Phacelia malvifolia	stinging phacelia	PHMA	NF
Phalaris lemmonii	Lemmon's cannarygrass	PHLE	NF
Pinus radiata	Monterey pine	PIRA	NP
Plantago coronopus	cut-leaved plantain	PLCO	NNF
Plantago erecta	California plantain	PLER	NF
Polycarpon tetraphyllum var. *tetraphyllum*	four-leaved allseed	POTET	NNF
Polypogon monspeliensis	rabbitsfoot grass	POMO	NNF
Pseudognaphalium beneolens	fragrant everlasting	PSBE	NP
Pseudognaphalium luteoalbum	weedy cudweed	PSLU	NNF
Pseudognaphalium ramosissimum	pink everlasting	PSRA	NP
Pseudognaphalium stramineum	cotton-batting plant	PSST	NP
Quercus agrifolia	coast live oak	QUAG	NP
Rubus ursinus	California blackberry	RUUR	NP
Rumex acetosella	sheep sorrel	RUAC	NNP
Rumex crispus	curly dock	RUCR	NNP
Rumex salicifolius	willow leaved dock	RUSA	NP
Salvia mellifera	black sage	SAME	NP
Silene gallica	small-flower catchfly	SIGA	NNF
Sonchus asper	prickly sow thistle	SOAS	NNF
Sonchus oleraceus	common sow thistle	SOOL	NNF
Stachys ajugoides	bugle hedge-nettle	STAJ	NP
Stipa pulchra	purple needle grass	STPU	NP
Trifolium dubium	little hop clover	TRDU	NNF
Trifolium hirtum	rose clover	TRHI	NNF
Trifolium microcephalum	small-head clover	TRMI	NF
Verbena lasiostachys var. *lasiostachys*	western vervain	VELAL	NP
Zeltnera davyi	Davy's centaury	ZEDA	NF

* HMP species

9.8.2.3 Vegetative Cover

Burleson surveyed five 50-meter line-intercept transects at HA 28. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 44.06%. The mean vegetative cover by native shrubs and perennials was greater in 2022 than 2019 by 13.04%. However, only four transects were completed in 2016-2019 while five were completed in 2022.

Table 9-52 summarizes vegetative cover and Table 9-53 presents vegetative cover by species. Figure 9-15 presents the percent cover of dominant species at HA 28 in 2016, 2017, 2018, 2019 and 2022.

Table 9-52. Transect Survey Summary for HA 28

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA28T01	47.68	47.68	0.00	78.58	18.58
HA28T02	27.24	26.84	0.00	59.64	38.92
HA28T03	64.54	64.54	0.00	67.90	30.04
HA28T04	21.40	18.62	1.92	70.26	27.06
HA28T05*	67.10	62.60	4.50	100.00	0.00
SITE AVERAGE	**45.59**	**44.06**	**1.28**	**75.28**	**22.92**

*Transect HA28T05 was added in 2022

Table 9-53. Transect Survey Results for HA 28 by Species

Transect	ACGL (%)	ACMI (%)	ADFA (%)	ARCA (%)	ARHO* (%)	ARMO* (%)	ARPU* (%)	ARTO (%)	BAPI (%)	BRDI (%)	CATU (%)	CEDE (%)	CERI* (%)	COFI (%)	CRSC (%)	DIAU (%)	ELGL (%)
HA28T01	2.34	0.00	4.00	0.00	0.00	3.56	24.82	0.40	0.00	0.00	0.00	0.00	0.92	0.00	0.66	0.48	0.00
HA28T02	2.20	0.00	0.22	0.00	0.00	0.00	12.56	0.00	0.00	0.00	0.00	0.00	2.18	0.24	8.60	0.00	0.00
HA28T03	2.28	0.00	5.08	0.00	5.36	3.58	6.66	15.54	1.80	0.00	0.00	8.22	12.06	0.20	2.34	0.00	0.00
HA28T04	6.76	0.22	0.00	0.00	0.00	0.00	2.66	0.00	0.00	0.00	0.32	0.00	0.00	0.22	5.32	0.00	0.00
HA28T05	0.82	0.00	0.90	2.06	3.88	4.76	13.12	2.86	24.32	2.82	0.00	0.00	0.00	0.00	0.00	0.00	1.24
SITE AVERAGE	**2.88**	**0.04**	**2.04**	**0.41**	**1.85**	**2.38**	**11.96**	**3.76**	**5.22**	**0.56**	**0.06**	**1.64**	**3.03**	**0.13**	**3.38**	**0.10**	**0.25**

Table 9-53 (continued). Transect Survey Results for HA 28 by Species

Transect	ERCO (%)	ERER (%)	FEMY (%)	HEGR (%)	HOCU (%)	HYRA (%)	LEPE (%)	LOGA (%)	LUCH/ LUAL (%)	NAHA (%)	PLER (%)	PSBE (%)	RUUR (%)	SAME (%)	STPU (%)	TH (%)	BG (%)
HA28T01	0.00	0.88	0.00	0.00	1.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.02	0.00	78.58	18.58
HA28T02	0.00	0.00	0.00	0.20	0.84	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	59.64	38.92
HA28T03	0.20	0.00	0.00	0.00	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	67.90	30.04
HA28T04	0.00	0.00	0.74	0.20	0.54	0.24	0.20	0.94	2.02	0.00	0.46	0.36	0.00	0.20	0.00	70.26	27.06
HA28T05	0.00	0.00	1.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.12	7.00	0.52	100.00	0.00
SITE AVERAGE	**0.04**	**0.18**	**0.48**	**0.08**	**0.84**	**0.05**	**0.04**	**0.19**	**0.40**	**0.04**	**0.09**	**0.07**	**0.22**	**3.04**	**0.10**	**75.28**	**22.92**

* HMP Species

† Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of transect data and comparison to the success criteria (see section 6.1.4).

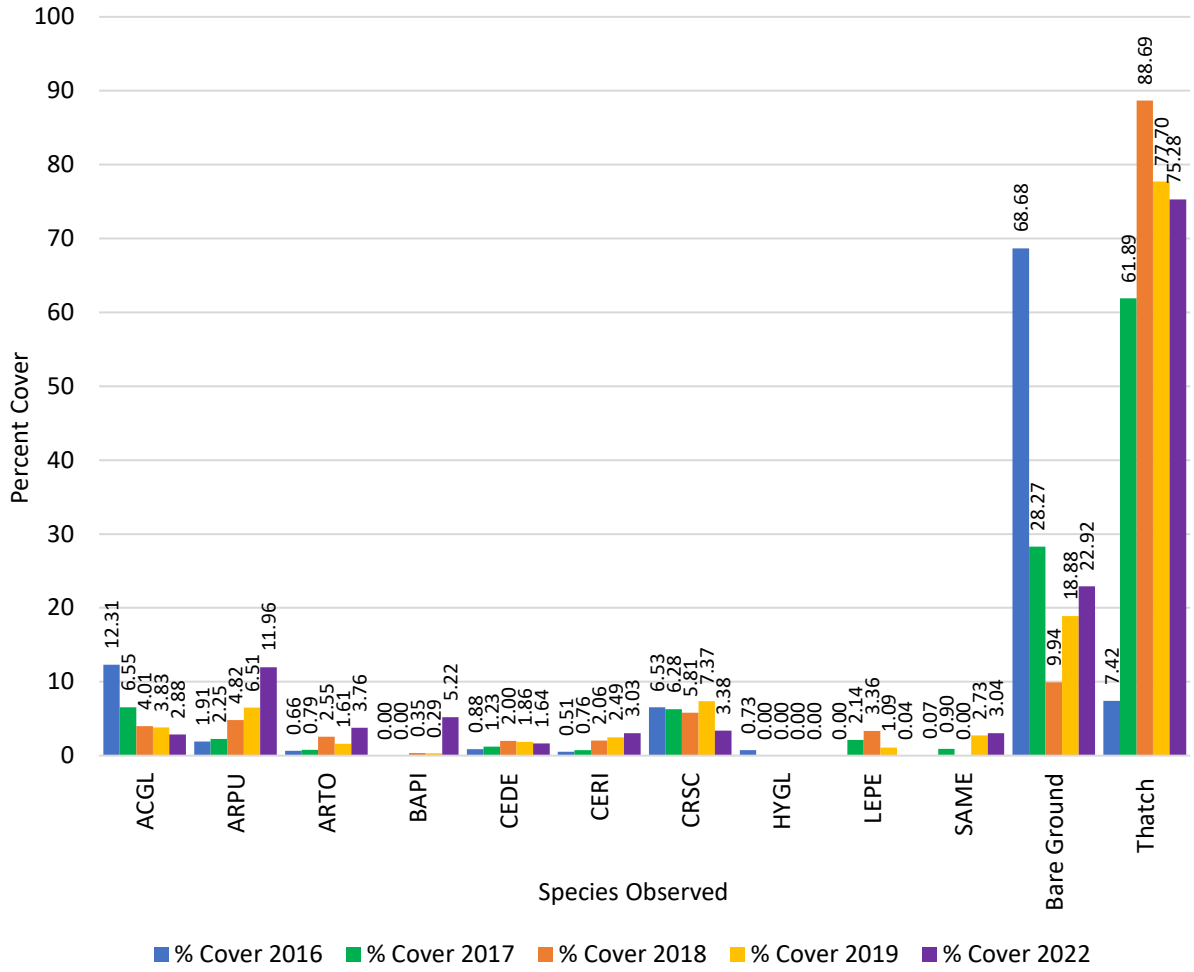


Figure 9-15. Percent Cover of Dominant Species at HA 28 in 2016, 2017, 2018, 2019, and 2022.

9.8.3 Monitoring Results Discussion

9.8.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 28. The SSRP baseline density class for Monterey spineflower was low. Year 8 Monterey spineflower restoration plot results show that the density met the success criterion under Objective 3 for two out of three plots. In addition, Monterey spineflower was also present outside the restoration plots.

9.8.3.2 Species Richness

Chamise, Monterey manzanita, sandmat manzanita, shaggy-bark manzanita, Monterey ceanothus, wedge-leaved Horkelia (*Horkelia cuneata*), and black sage were present, therefore HA 28 met the success criterion for Objective 1.

9.8.3.3 Vegetative Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlines in the SSRP. For Objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 18 shrub and perennial species presented in Table 2 of the HA 28 SSRP (Burleson, 2013). These species contributed 40.82% cover to the HA, an increase of 11.81% since 2019. This success criterion was met (see Figure 9-16).

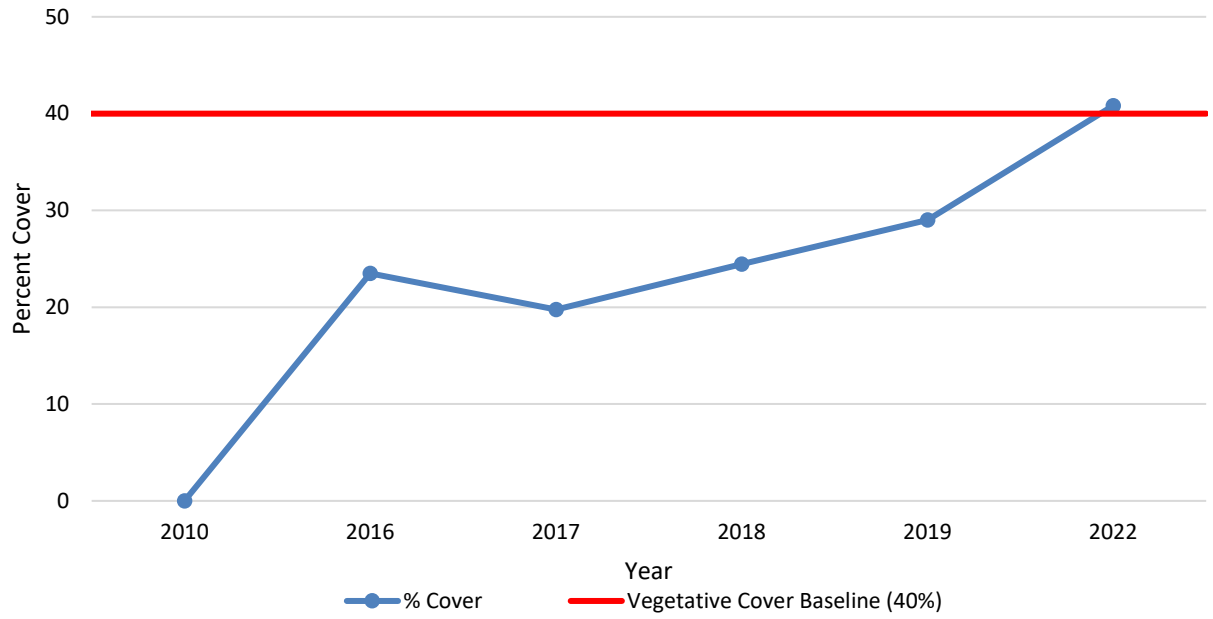


Figure 9-16. Native Vegetative Cover Compared to the Success Criterion at HA 28

Objective 2 considers the percent cover of non-native target weeds. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 3. Cover class 3 ranges from 6-25% of absolute cover. The HMP shrub species at HA 28 provided an absolute cover of 17.38%; therefore, the HA met this success criterion. This was an increase of 7.72% from 2019. The second success criterion is no net loss of HMP shrubs. For HA 28, this means a vegetative cover average of at least 35% cover for sandmat manzanita and presence of Monterey ceanothus and Monterey manzanita. The average vegetative cover for sandmat manzanita was 11.96%, Monterey ceanothus was 3.03%, and Monterey manzanita was 2.38% (see Figure 9-17). Sandmat manzanita, Monterey ceanothus, and Monterey manzanita increased in cover from 2019 to 2022. In 2022, two of the three species, Monterey ceanothus and Monterey manzanita, met the success criterion but sandmat manzanita did not. The success criterion was not met; however, cover increased between 2019 and 2022.

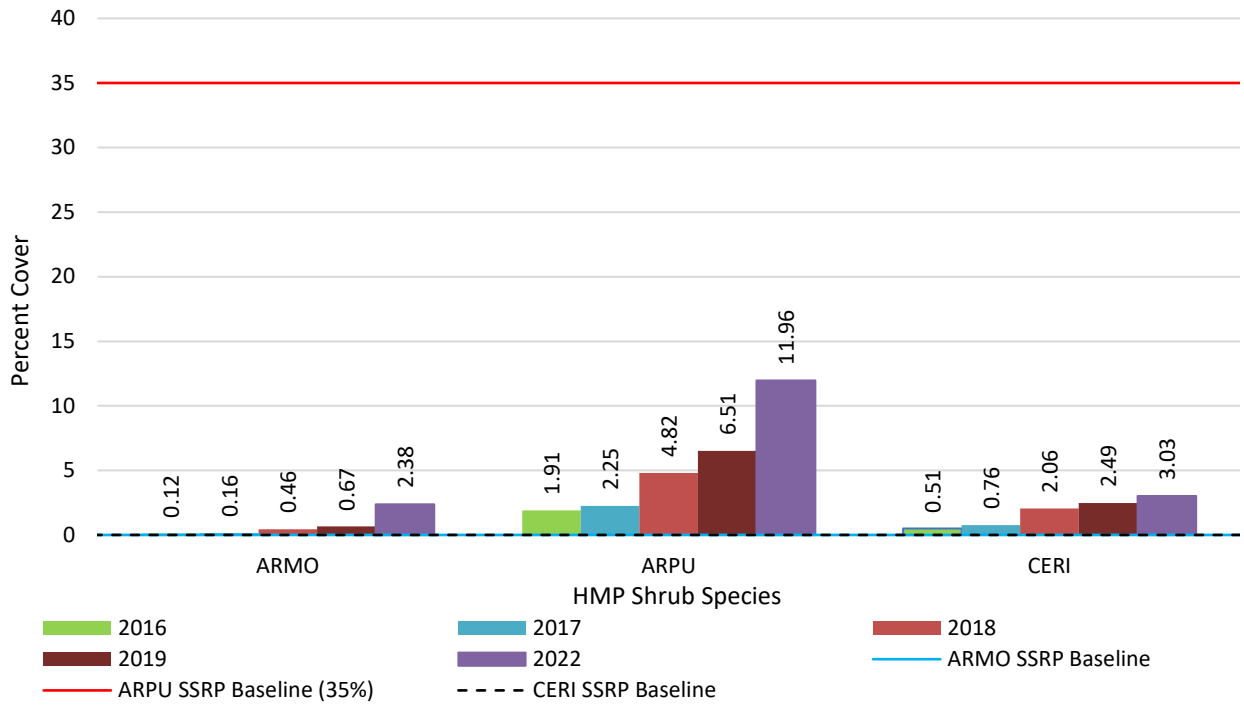


Figure 9-17. HMP Shrub Species Comparison to Success Criteria at HA 28

9.8.4 HA Status Discussion

HA 28 was in year 8 of monitoring in 2022; species richness, vegetative cover, and HMP annual density monitoring were conducted. In 2019, year 5 of monitoring, the site met four of six success criteria. In 2022, year 8 of monitoring, the site met five of six success criteria. HA 28 is positively trending toward meeting success for most criteria, but it is unlikely to meet all criteria by year 13, 2027. For the HMP cover by species criterion, there is a low chance of meeting the requirement for sandmat manzanita cover, and a high chance that Monterey manzanita and Monterey ceanothus will meet the required cover, which were both met in year 8 (see Table 9-54).

The SSRP prescription for active restoration was fulfilled in the 2018/2019 season (Burleson, 2020). An additional monitoring transect (HA28T05) was added in the central mulched area prior to monitoring in 2022 per recommendations from previous years to better represent the vegetative cover at the site and assess restoration progress (see Figure 9-11; Burleson, 2020). The Army has no further recommendations at this time. Overall, HA 28 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-9 and Appendix F, page F-1).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in year 13, 2027 (see Table 9-47).

Table 9-54. Status for Achieving Success Criteria at HA 28

Success Criterion	Category	Acceptable Limits	Year 5 (2019) Met	Year 8 (2022) Met	Likelihood of Achieving Success by Year 13 (2027)	Notes
Objective 1 – No. 1	Species richness	7 required species: ADFA, ARMO, ARPU, ARTO, CERI, HOCU, SAME	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	Yes	HIGH	**Year 5**: 29.01% **Year 8**: 40.82%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Yes	Yes	HIGH	**Year 5**: 9.66% **Year 8**: 17.38%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 35% ARMO = present CERI = present	No	No	LOW for ARPU HIGH for ARMO HIGH for CERI	**Year 5**: ARPU 6.51% ARMO 0.67% CERI 2.49% **Year 8**: ARPU 11.96% ARMO 2.38% CERI 3.03%
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Yes	NA	(Year 13 monitoring not required)

9.9 HA 29

HA 29 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010; 1,700 cubic yards of soil were excavated from 1.0 acre (Shaw, 2008). HA 29 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 29 varies in elevation with a west aspect. Adjacent lands were not developed and contain substantial amounts of intact native vegetation that may promote natural recruitment in restoration areas. HA 29 was heavily disturbed and covered with jubata grass (*Cortaderia jubata*) prior to soil remediation. Approximately half of HA 29 has compacted soil.

HA 29 is located on the southern portion of Site 39 within Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 29 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and installing native container-grown plants, cuttings, and burls. Areas within HA 29 which are less than 1.0 acre or larger than 1.0 acre but less than 100 feet wide were restored passively using broadcast seed only. Areas larger than 1.0 acre and greater than 100 feet across received both active and passive restoration efforts. The potential for erosion at HA 29 exists along slopes surrounding excavated areas.

Restoration at HA 29 occurred from 2011 to 2013 and quantitative monitoring began in 2013. Additional seed was broadcast in 2016, 2018, 2019, 2020, and 2022 and additional plants were installed in 2019 and 2021. The HA was monitored for 12 years by photo documentation and site visits, three years for plant survivorship, and four years for species richness and vegetative cover (see Table 9-55). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-18 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. Success criteria for HA 29 are summarized in Table 9-56.

Table 9-55. Historic Summary of Restoration and Monitoring Activities at HA 29

Activity	Monitoring Years												
			1	2	3	4	5	6	7	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025
Restoration: Active, Passive, Erosion Control, and Corrective Measures	●	●	●			●		●	●	●	●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Species Richness						●	●	●		●			●
Vegetative Cover						●	●	●		●			●
Plant Survivorship			●	●	●								

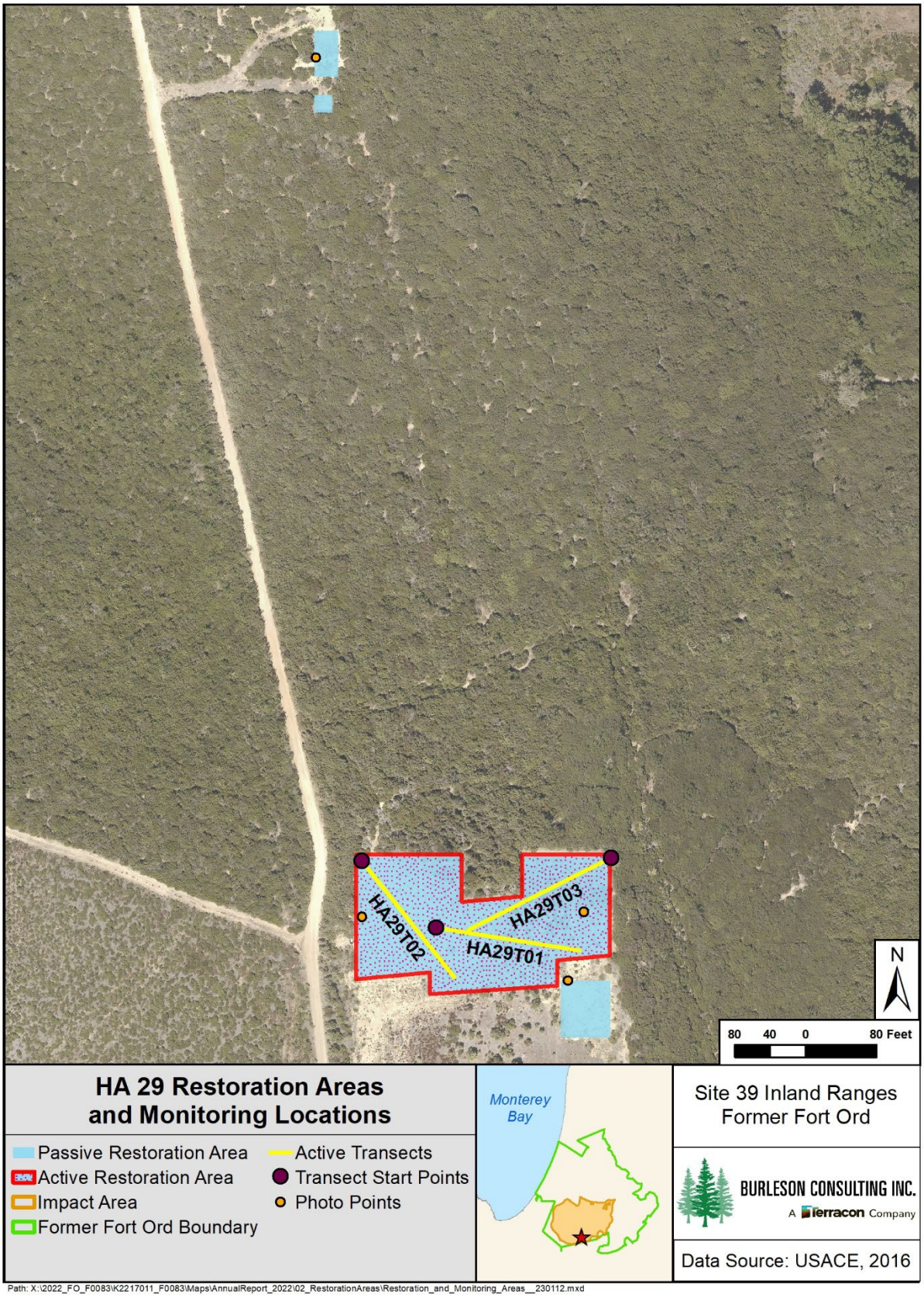


Figure 9-18. HA 29 Restoration Areas and Monitoring Locations Map

Table 9-56. Success Criteria and Acceptable Limits for Restoration of HA 29

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise Hooker's manzanita† Monterey manzanita† shaggy-bark manzanita sandmat manzanita† coyote brush Monterey ceanothus† Eastwood's goldenbush† golden yarrow toyon peak rush-rose wedge-leaved horkelia deerweed sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated that jubata grass was present at 11%. Therefore, no more than 5% non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4 (26-50% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 7.
			Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 27.

Table 9-56. Success Criteria and Acceptable Limits for Restoration of HA 29

	Objective 3*		
4			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1
			Eastwood gold fleece percent cover, as an average of transect data, must be equal or greater than 2
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.9.1 Restoration Activities

Burleson performed passive restoration at HA 29 in 2012, 2016, 2018, 2019, 2020, and 2022. The total amount of seed broadcast on site was 66.49 lb compared to the 24.65 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities and adaptive management. Table 9-57 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-57. Summary of Passive Restoration Activities for HA 29

Species	**Pounds of Seed Broadcast**								
	SSRP Target	**2012 (Feb)**	**2012 (Dec)**	**2016**	**2018**	**2019**	**2020**	**2022**	**Total by Species**
ACMI	-	-	-	0.800	0.800	0.600	4.000	2.000	8.200
ACGL	2.000	1.000	1.025	1.600	-	-	4.000	4.000	11.625
ADFA	1.000	0.500	0.505	-	-	-			1.005
ARHO*	2.000	1.000	1.019	-	-	-			2.019
ARMO*	2.000	1.000	1.011	-	-	-			2.011
ARPU*	1.000	0.500	0.520	-	-	-			1.020
ARTO	2.000	1.000	1.010	-	-	-			2.010
BAPI	0.150	-	0.083	-	-	-			0.083
CERI*	1.000	-	1.035	-	-	-			1.035
CRSC	1.000	0.500	0.515	-	-	-			1.015
DIAU	0.100	0.300	0.316	-	-	-			0.616
ELGL	-	-	-	1.600	2.000	1.600		5.000	10.200
ERCO	0.300	0.200	0.160	-	-	-			0.360
ERFA*	0.100	0.058	0.059	-	-	-			0.117
HO	9.000	-	9.030	-	-	-			9.030
HOCU	2.000	1.000	1.021	1.600	1.600	0.800			6.021
SAME	1.000	0.600	0.523	-	-	-			1.123
STPU	-	-	-	1.000	2.000	1.000		5.000	9.000
TOTAL	**24.650**	**7.658**	**17.832**	**6.600**	**6.400**	**4.000**		**16.000**	**66.490**

* HMP species

Active restoration was conducted in 2012, 2013, 2019, and 2021 at HA 29; SSRP planting was completed in 2013. AMP planting events occurred in 2019 and 2021 per recommendations made in the 2016 and 2017 Annual Reports (Burleson, 2017; Burleson, 2018). The total number of plants installed at HA 29 was 2,091 compared to 1,374 prescribed in the SSRP. Table 9-58 summarizes the plants installed during active restoration.

Table 9-58. Summary of Active Restoration Activities for HA 29

Species	Number of Individual Plants					
	SSRP Target	2012	2013	2019	2021	Total by Species
ACGL	189	225	-	-	-	225
ADFA	101	-	120	-	-	120
ARHO*	4	-	5	-	60	65
ARMO*	13	-	15	-	60	75
ARPU*	17	-	20	-	180	200
ARTO	21	-	25	-	-	25
BAPI	76	91	-	-	-	91
CERI*	4	-	5	-	60	65
CRSC	189	225	-	-	-	225
DIAU	189	225	-	-	-	225
ERCO	189	225	-	-	-	225
ERFA*	4	-	25	-	60	85
HEAR	-	-	-	15	-	15
HOCU	189	225	-	-	-	225
SAME	189	225	-	-	-	225
TOTAL	**1,374**	**1,441**	**215**	**15**	**420**	**2,091**

* HMP species

9.9.2 Monitoring Results

HA 29 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-10).

9.9.3 HA Status Discussion

In 2017, year 5 of monitoring, HA 29 met one of five success criteria. In 2020, year 8 of monitoring, HA 29 met two of five success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 29 has a low chance of meeting absolute HMP shrub cover and HMP shrub cover by species criteria (see Table 9-59).

Per recommendations in the 2016 Annual Report, toyon (*Heteromeles arbutifolia*) was planted in the 2018/2019 season to support species richness and Hooker's manzanita (*Arctostaphylos hookeri*), Monterey manzanita, sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush were planted in the 2020/2021 season to support the HMP shrub cover criteria (Burleson, 2017). Two additional monitoring transects were installed in 2018 per recommendations in the 2017 Annual Report to better represent site conditions and assess restoration progress (Burleson, 2018). Native vegetation cover values increased significantly since installation of the second and third transects. The Army has no further recommendations at this time. HA 29 was last monitored in 2020 and AMP planting occurred in

the 2020/2021 wet season. The site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-10).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-55).

Table 9-59. Status for Achieving Success Criteria at HA 29

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	15 required species: ADFA, ARHO, ARMO, ARTO, ARPU, BAPI, CERI, ERFA, ERCO, HEAR, CRSC, HOCU, ACGL, DIAU, SAME	No	Yes	HIGH	**Year 5**: HEAR absent **Year 8**: met (AMP planting occurred in 2018/2019)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	HIGH	**Year 5**: 12.32% **Year 8**: 29.87% (AMP planting occurred in 2021)
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.70% **Year 8**: 0.21%
Objective 3 – No. 4	HMP shrub cover	Cover class 4: 26-50%	No	No	LOW	**Year 5**: 0.62% **Year 8**: 8.35% (AMP planting occurred in 2021)
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 27% ARMO ≥ 7% ARHO ≥ 2% CERI ≥ 1% ERFA ≥ 2%	No	No	LOW for ARPU LOW for ARMO LOW for ARHO HIGH for CERI LOW for ERFA	**Year 5**: ARPU 3.14% ARMO 0.00% ARHO 0.00% CERI 0.00% ERFA 0.00% **Year 8**: ARPU 6.83% ARMO 0.96% ARHO 0.00% CERI 0.56% ERFA 0.00% (ARPU, ARMO, CERI, and ERFA were planted in 2021)
Objective 3 – No. 4	HMP annual density	NA	NA	NA	NA	NA

9.10 HA 33

HA 33 was used by the Army as a demolitions range. Soil remediation was completed in 2010; 20 cubic yards of soil were excavated from 0.01 acres (Shaw, 2008). HA 33 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 33 is relatively flat with southwest and west aspects. Adjacent lands are heavily dominated by hottentot fig (*Carpobrotus edulis*) and other non-native species and disturbed central maritime chaparral.

HA 33 is located on the eastern portion of Site 39, occurring within Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 33 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 33 is relatively flat with little potential for erosion.

Restoration at HA 33 occurred in 2011, 2012, 2016, 2019, and 2020 and quantitative monitoring began in 2013. The HA was monitored for 12 years by photo documentation and site visits; seven years for HMP annual density in plots; and four years for HMP annual density across the HA, species richness, and vegetative cover (see Table 9-60). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-19 shows the HA footprint, passive restoration area, and transect survey locations. Success criteria for HA 33 are summarized in Table 9-61.

Table 9-60. Historic Summary of Restoration and Monitoring Activities at HA 33

Activity	Monitoring Years												
			1	2	3	4	5	6	7	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025
Restoration: Active and Passive	●	●				●			●	●			
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●		●			
HMP Annual Density across HA						●	●	●		●			
Species Richness						●	●	●		●			●
Vegetative Cover						●†	●	●		●			●

† Vegetative cover was monitored using quadrats in 2016

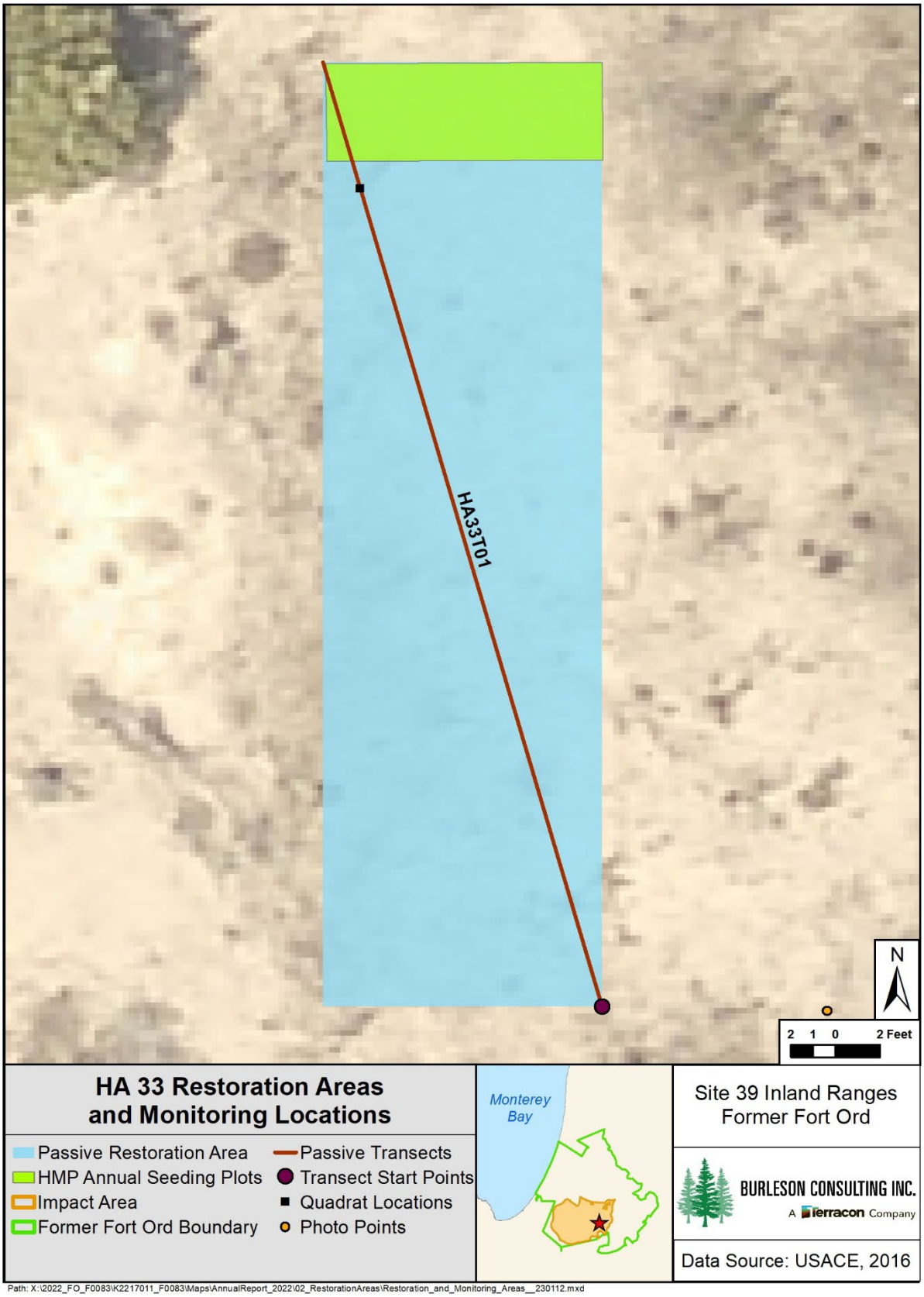


Figure 9-19. HA 33 Restoration Areas and Monitoring Locations Map

Table 9-61. Success Criteria and Acceptable Limits for Restoration of HA 33

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			common yarrow Monterey manzanita† shaggy-bark manzanita coyote brush Monterey ceanothus† dwarf ceanothus golden yarrow toyon peak rush-rose wedge-leaved horkelia deerweed sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline surveys indicated that ice plant was present at HA-33 but was not available in transect data‡. Therefore, no more than 5% non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 4 (26-50% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 30.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 5.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

‡ Source: Shaw 2009a

9.10.1 Restoration Activities

Burleson performed passive restoration at HA 33 in 2011, 2012, 2019, and 2020. The total amount of seed broadcast on site was 3.787 lb compared to 0.2382 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities and adaptive management. Table 9-62 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower. One plot was chosen based on its suitable habitat for Monterey spineflower and adjacent extant populations (see Figure 9-19).

Table 9-62. Summary of Passive Restoration Activities for HA 33

Species	Pounds of Seed Broadcast					
	SSRP Target	2011	2012	2019	2020	Total by Species
ACMI	0.0100	0.007	0.007	0.100	0.400	0.514
ACGL	0.0200	0.011	0.011	0.300	0.400	0.722
ADFA	0.0100	0.007	0.011	-	-	0.018
ARMO*	0.0200	0.012	0.011	-	-	0.023
ARPU*	-	0.007	0.007	-	-	0.014
BAPI	0.0015	-	0.001	0.100	-	0.101
CERI*	0.0100	0.010	0.006	0.100	-	0.116
CHPUP*	0.0002	0.011	0.001	0.010	-	0.022
CRCA	0.0100	0.007	0.007	-	-	0.014
CRSC	0.0100	0.007	0.007	-	-	0.014
DIAU	0.0010	0.003	0.011	0.050	-	0.064
ELGL	-	-	-	0.880	-	0.880
ERCO	0.0030	0.003	0.002	0.030	-	0.035
ERER	0.0025	0.003	0.002	-	-	0.005
ERFA	-	-	-	0.010	-	0.010
HO	0.0900	-	0.090	1.000	-	1.090
HOCU	0.0200	0.011	0.011	0.040	-	0.062
SAME	0.0100	-	0.011	-	-	0.011
STCE	0.0200	0.011	0.011	-	-	0.022
STPU	-	-	-	0.050	-	0.050
TOTAL	**0.2382**	**0.110**	**0.207**	**2.670**	**0.800**	**3.787**

* HMP species

No active restoration was prescribed at HA 33; however, AMP planting events occurred in 2019 and 2020 per recommendations made in the 2016 and 2018 Annual Reports (Burleson, 2017; Burleson, 2019). A total of 184 plants were installed at HA 33. Table 9-63 summarizes the plants installed during active restoration.

Table 9-63. Summary of Active Restoration Activities for HA 33

Species	Number of Individual Plants		
	2019	2020	Total by Species
ACGL	-	11	11
ACMI	-	2	2
ADFA	-	10	10
ARCA	-	5	5
ARHO*	-	3	3
ARMO*	12	3	15
ARTO	5	3	8
BAPI	-	12	12
CEDE	15	-	15
CERI*	12	4	16
CRSC	-	11	11
DIAU	10	7	17
ERCO	5	6	11
FRCA	-	3	3
GAEL	-	9	9
HEAR	5	-	5
HOCU	-	11	11
LECA	-	5	5
LUAR	-	4	4
SAME	5	6	11
TOTAL	**69**	**115**	**184**

*HMP species

9.10.2 Monitoring Results

HA 33 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-11).

9.10.3 HA Status Discussion

In 2017, year 5 of monitoring, HA 33 met two of six success criteria. In 2020, year 8 of monitoring, the site met three of six success criteria. Overall, the site is positively trending toward meeting success criteria but it likely will not meet all criteria by year 13 of monitoring, 2025. HA 33 has a moderate chance of meeting the native vegetation cover criterion, and a low chance of meeting the absolute HMP shrub cover, and HMP shrub cover by species criteria (see Table 9-64).

Per recommendations in the 2016 Annual Report, shaggy-bark manzanita, Monterey manzanita, dwarf ceanothus, golden yarrow, toyon, sticky monkeyflower, and black sage were planted in the 2018/2019 season to support the species richness and HMP shrub cover success criteria (Burleson, 2017). Per

recommendations in the 2018 Annual Report Monterey manzanita and Monterey ceanothus were planted in the 2019/2020 season to support the HMP shrub cover success criterion, and 16 additional native species were planted to support the native vegetation cover success criterion (Table 9-63) (Burleson, 2018). The Army recommends additional seed broadcast in barren areas to address the native vegetation cover criterion. Overall, the site needs more time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-11).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-60).

Table 9-64. Status for Achieving Success Criteria at HA 33

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	13 Required species: ACMI, ARMO, ARTO, BAPI, CERI, CEDE, ERCO, HEAR, CRSC, HOCU, ACGL, DIAU, SAME	No	Yes	HIGH	**Year 5**: DIAU, ERCO, HEAR, and SAME absent **Year 8**: met (AMP planting occurred in 2018/2019 and 2019/2020)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	MODERATE	**Year 5**: 4.92% **Year 8**: 12.25% (AMP planting occurred in 2018/2019, 2019/2020)
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 4: 26-50%	No	No	LOW	**Year 5:** 0.00% **Year 8:** 0.00% (ARMO and CERI planted in 2018/2019 and 2019/2020)
Objective 3 – No. 4	HMP shrub cover by species	ARMO ≥ 30% CERI ≥ 5%	No	No	LOW	**Year 5**: ARMO 0.00% CERI 0.00% **Year 8**: ARMO 0.00% CERI 0.00% (ARMO and CERI planted in 2018/2019 and 2019/2020)
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Yes	NA	**Year 5**: met **Year 8**: met (Year 13 monitoring not required)

9.11 HA 34

HA 34 was used by the Army as a multi-use range that included a closed combat course, machine gun assault course, and mortar range. An estimated total of 26,300 cubic yards of soil were excavated, including erosion control activities, over approximately 9.7 acres. HA 34 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). The lower portion of HA 34 is moderately sloped and oriented east-west with a ridge in the center of the range. The upper portion of HA 34 is steep and highly susceptible to erosion. Adjacent lands range from low to very high-quality habitat.

HA 34 is located on the northeastern portion of Site 39, within the Aromas formation containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 34 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and installing native container-grown plants. In 2020, the success criteria for HA 34 were revised due to the marginal response to restoration efforts. Under the revised success criteria: HMP shrub cover class was reduced from three to two and HMP shrub cover by species was reduced for Monterey manzanita, Monterey ceanothus, and Hooker's manzanita from 31%, 7%, and 4% respectively, to equal or greater than 1 percent for each species (USFWS, 2020).

Restoration at HA 34 occurred from 2012 to early 2023 and quantitative monitoring began in 2016. HA 34 was monitored for 11 years by photo documentation and site visits, seven years for plant survivorship, and five years for species richness and vegetative cover (see Table 9-65). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-20 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 34 are summarized in Table 9-66.

Table 9-65. Historic Summary of Restoration and Monitoring Activities at HA 34

Activity	Monitoring Years												
				1	2	3	4	5	6	7	8	9	13
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2027
Restoration: Active, Passive, and Erosion Control	●	●	●	●	●	●	●	●	●	●	●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Species Richness					●	●	●	●			●		●
Vegetative Cover					●	●	●	●			●		●
Plant Survivorship					●	●	●	●	●	●	●	●	

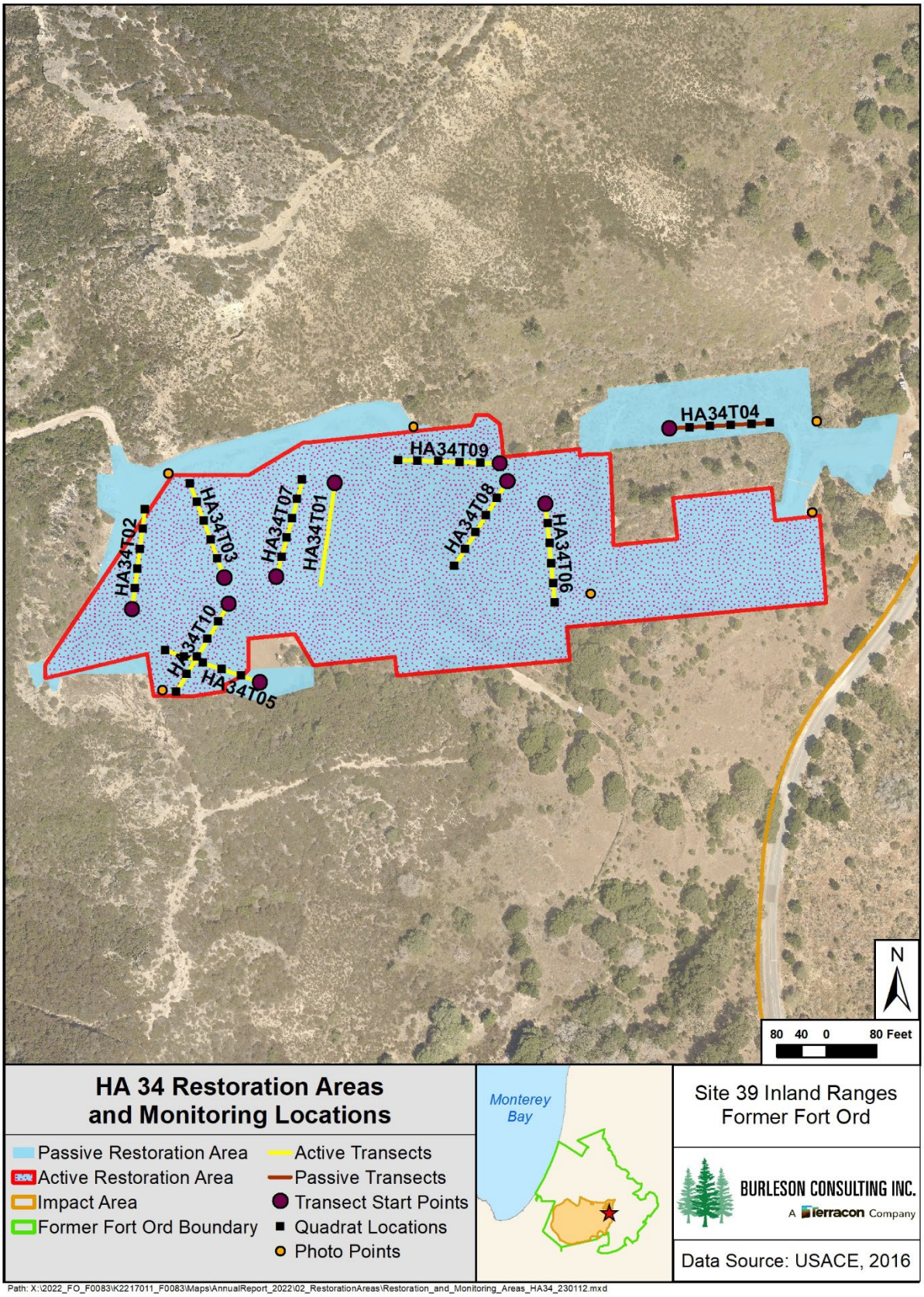


Figure 9-20. HA 34 Restoration Areas and Monitoring Locations Map

Table 9-66. Success Criteria and Acceptable Limits for Restoration of HA 34

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise Monterey manzanita† shaggy-bark manzanita Hooker's manzanita† Monterey ceanothus† sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated the non-native target weed species iceplant. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 2‡ (1-5% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 1‡.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1‡.
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1‡.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

‡ Updated success criteria approved by USFWS (USFWS, 2020)

9.11.1 Restoration Activities

Burleson performed passive restoration at HA 34 each year from 2012 to 2022. The total amount of seed broadcast on site was 1,381.24 lb compared to the 320.41 lb prescribed in the SSRP. Due to high erosion rates on the site, we conducted multiple years of additional seeding that eventually more than tripled the SSRP prescription. After an initial broadcast of approximately 400 lbs of seed in 2012, heavy erosion events occurred that warranted regrading of the site. This nullified the original application of seed and an additional broadcast of approximately 400 additional pounds was applied. In the years following, additional seed was broadcast when subsequent erosion repair activities were performed, as well as in barren areas to improve vegetative cover and prevent erosion where container plant installation was less successful. Table 9-67 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-67. Summary of Passive Restoration Activities for HA 34

Species	Pounds of Seed Broadcast												
	SSRP Target	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total by Species
ACMI	15.41	9.51	-	1.69	1.00	5.72	0.50	2.00	2.85	10.00	2.20	8.60	44.07
ACGL	19.40	18.29	-	3.37	2.00	11.40	1.00	0.20	-	13.50	3.60	12.65	66.01
ADFA	-	9.50	-	-	-	-	-	-	-	-	-	-	9.50
ARCA	15.50	9.50	4.60	-	1.00	-	-	-	-	1.25	0.80	0.80	17.95
ARHO*	-	9.50	-	-	-	-	-	-	-	-	-	-	9.50
ARMO*	-	9.50	-	-	-	-	-	-	-	-	-	-	9.50
ARTO	-	19.00	-	-	-	-	-	-	-	-	-	-	19.00
BAPI	1.90	1.40	1.35	0.25	0.20	-	-	-	-	0.25	0.16	0.16	3.77
CERI*	15.50	9.50	3.30	-	1.00	-	-	-	-	1.25	0.80	0.80	16.65
CRSC	15.50	9.15	-	1.26	1.00	-	-	-	-	1.25	0.80	0.80	14.26
DIAU	1.50	0.95	-	0.25	0.10	-	-	-	-	0.13	0.08	0.08	1.59
ELGL	87.30	85.50	46.00	80.34	9.00	14.88	27.05	6.40	8.40	33.00	16.80	32.70	360.07
ERCO	2.90	2.85	-	2.11	0.30	-	-	-	-	0.38	0.24	0.24	6.12
HO	87.30	150.00	245.00	33.70	9.00	2.32	101.20	17.40	1.20	15.50	8.00	26.25	609.57
HOCU	19.40	18.29	4.60	46.97	2.00	11.40	1.00	2.80	3.80	-	1.60	1.60	94.06
LUAR	9.70	9.50	-	-	1.00	-	-	-	-	1.25	0.80	0.80	13.35
SAME	9.70	9.51	0.60	3.37	1.00	-	-	-	-	1.25	0.80	0.80	17.33
STPU	19.40	19.00	-	-	2.00	6.99	1.25	4.00	5.25	2.35	6.40	21.70	68.94
TOTAL	**320.41**	**400.45**	**305.45**	**173.31**	**30.60**	**52.71**	**132.00**	**32.80**	**21.50**	**81.36**	**43.08**	**107.98**	**1,381.24**

* HMP species

Active restoration was conducted in 2016, 2017, 2019, 2021, 2022, and 2023. The total number of plants installed at HA 34 was 15,781 compared to 12,150 prescribed in the SSRP. Table 9-68 summarizes the plants installed during active restoration.

Table 9-68. Summary of Active Restoration Activities for HA 34

Species	Number of Individual Plants							
	SSRP Target	2016 (Jan)	2016-2017 (Dec-Feb)	2018-2019 (Dec-Jan)	2021	2022	2023	Total by Species
ACMI	500	54	154	110	-	36	10	364
ACGL	1,500	350	570	441	178	176	40	1,755
ADFA	500	158	372	223	74	144	60	1,031
ARCA	500	135	208	210	92	130	-	775
ARHO*	500	76	286	272	237	132	30	1,033
ARMO*	500	76	277	148	171	107	30	809
ARTO	500	76	118	199	94	114	-	601
BAPI	500	95	270	248	92	120	-	825
CERI*	500	132	556	266	227	149	30	1,360
CRSC	1,500	228	534	391	175	349	30	1,707
DIAU	1,500	246	406	348	183	236	-	1,419
ERCO	800	-	320	295	84	188	10	897
FRCA	-	-	-	10	-	-	-	10
GAEL	-	-	-	9	-	-	-	9
HOCU	1,500	17	91	553	175	341	10	1,187
LECA	-	-	-	25	-	-	-	25
LUAL	-	-	108	-	-	-	-	108
LUAR	500	95	236	185	92	125	-	733
SAME	850	45	330	324	147	237	50	1,133
TOTAL	**12,150**	**1,783**	**4,836**	**4,257**	**2,021**	**2,584**	**300**	**15,781**

* HMP Species

9.11.2 Monitoring Results

9.11.2.1 Plant Survivorship

Plant survivorship monitoring was conducted at HA 34 for plants installed in 2016, 2017, 2019, 2021, and 2022. A total of 13 shrub species and 810 individual plants were monitored for survivorship. By year 3 of monitoring, survivorship was 60% for the 2016 planting, 23% for the 2017 planting, and 16% for the 2019 planting. By year 2 of monitoring for the 2021 planting, survivorship was 16%. By year 1 of monitoring for the 2022 planting, survivorship was 26%. Tables 9-69 through 9-73 present results by species.

Table 9-69. Plant Survivorship Monitoring Summary for 2016 Plantings at HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2016)	Year Two (2017)	Year Three (2018)
			Alive (%)	Alive (%)	Alive (%)
ADFA	158	16	100	94	94
ARCA	135	14	86	92	79
ARHO*	76	8	63	63	63
ARMO*	76	8	75	75	63
ARTO	76	8	75	38	38
BAPI	95	10	90	90	90
CERI*	132	13	38	25	15
LUAR	95	10	60	10	0
SAME	45	5	100	100	100
TOTAL	**888**	**92**	**76**	**66**	**60**

* HMP Species

Table 9-70. Plant Survivorship Monitoring Summary for 2017 Plantings at HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2017)	Year Two (2018)	Year Three (2019)
			Alive (%)	Alive (%)	Alive (%)
ADFA	372	37	22	20	18
ARCA	208	22	55	38	32
ARHO*	286	32	50	38	33
ARMO*	277	28	36	25	19
ARTO	118	12	33	20	13
BAPI	270	28	86	86	81
CERI*	556	56	27	12	9
LUAL	108	11	18	0	0
LUAR	236	24	21	4	0
SAME	330	34	24	18	16
TOTAL	**2,761**	**285**	**36**	**27**	**23**

* HMP Species

Table 9-71. Plant Survivorship Monitoring Summary for 2019 Plantings at HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2019)	Year Two (2020)	Year Three (2021)
			Alive (%)	Alive (%)	Alive (%)
ADFA	223	21	48	19	19
ARCA	210	21	57	14	19
ARHO*	272	18	56	28	22
ARMO*	148	15	33	20	13
ARTO	199	20	40	5	0
BAPI	248	24	75	52	42
CERI*	266	22	64	36	23
FRCA	10	10	0	0	0
GAEL	9	8	38	0	0
LECA	25	10	20	0	0
LUAR	185	19	5	5	0
SAME	324	31	38	16	16
TOTAL	**2,119**	**220**	**43**	**19**	**16**

* HMP Species

Table 9-72. Plant Survivorship Monitoring Summary for 2021 Plantings at HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2021)	Year Two (2022)
			Alive (%)	Alive (%)
ADFA	74	8	30	13
ARCA	92	10	70	70
ARHO*	237	24	4	4
ARMO*	171	17	0	0
ARTO	94	9	11	0
BAPI	92	10	80	50
CERI*	227	21	26	14
LUAR	92	10	0	0
SAME	147	15	27	20
TOTAL	**1,226**	**124**	**23**	**16**

* HMP Species

Table 9-73. Plant Survivorship Monitoring Summary for 2022 Plantings at HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2022)
			Alive (%)
ADFA	48	9	78
ARCA	60	9	33
ARHO*	48	10	0
ARMO*	48	9	22
ARTO	48	10	30
BAPI	60	9	11
CERI*	60	10	20
LUAR	60	9	0
SAME	94	10	40
TOTAL	**526**	**85**	**26**

* HMP Species

9.11.2.2 Species Richness

Sixty-seven species were observed at HA 34. Of those, 30 were native shrubs or perennials, nine were native annual herbaceous species, and 28 were non-native species (see Table 9-74). Species richness decreased by 12 species since 2019. Native shrub and perennial species richness decreased by six, native herbaceous species richness decreased by seven, non-native species richness increased by two, and uncategorized species richness decreased by one. Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of species richness and comparison to the success criteria (see Section 6.1.4).

Table 9-74. Species Observed on HA 34, 2022

Scientific Names	Common Names	Code	Category
Achillea millefolium	common yarrow	ACMI	NP
Acmispon americanus var. *americanus*	Spanish clover	ACAMA	NF
Acmispon glaber	deerweed	ACGL	NP
Acmispon heermannii var. *orbicularis*	Heermann's lotus	ACHEO	NP
Acmispon strigosus	Bishop's lotus	ACST	NF
Adenostoma fasciculatum	chamise	ADFA	NP
Aira caryophyllea	silver hair grass	AICA	NNF
*Arctostaphylos hookeri**	Hooker's manzanita	ARHO	NP
*Arctostaphylos montereyensis**	Monterey manzanita	ARMO	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Avena barbata	slender wild oat	AVBA	NNF
Baccharis pilularis	coyote brush	BAPI	NP
Briza maxima	rattlesnake grass	BRMA	NNF
Bromus diandrus	ripgut brome	BRDI	NNF
Bromus hordeaceus	soft chess	BRHO	NNF
Bromus madritensis ssp. *rubens*	foxtail chess	BRMAR	NNF
Castilleja foliolosa	woolly indian paintbrush	CAFO2	NP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Centaurea melitensis	tocalote	CEME	NNF
Corethrogyne filaginifolia	common sandaster	COFI	NP
Cortaderia jubata	jubata grass	COJU	NNP

Table 9-74. Species Observed on HA 34, 2022

Scientific Names	Common Names	Code	Category
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Danthonia californica	California oat grass	DACA	NP
Deinandra corymbosa	coastal tarweed	DECO	NF
Diplacus aurantiacus	sticky monkeyflower	DIAU	NP
Elymus glaucus	blue wild-rye	ELGL	NP
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium botrys	long-beaked filaree	ERBO	NNF
Erodium cicutarium	red-stemmed filaree	ERCI	NNF
Festuca myuros	rattail sixweeks grass	FEMY	NNF
Festuca perennis	Italian rye grass	FEPE	NNF
Frangula californica	California coffeeberry	FRCA	NP
Heliotropium curassavicum var. *oculatum*	seaside heliotrope	HECUO	NP
Hesperocyparis macrocarpa	Monterey cypress	HEMA22	NP
Heteromeles arbutifolia	toyon	HEAR	NP
Heterotheca grandiflora	telegraph weed	HEGR	NF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Hypochaeris glabra	smooth cat's ear	HYGL	NNF
Lupinus arboreus	yellow bush lupine	LUAR	NP
Lupinus concinnus	bajada lupine	LUCO	NF
Lupinus nanus	sky lupine	LUNA	NF
Madia gracilis	slender tarweed	MAGR	NF
Madia sativa	coast tarweed	MASA	NF
Medicago polymorpha	California burclover	MEPO	NNF
Melilotus indicus	yellow sweetclover	MEIN	NNF
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP	NF
Petrorhagia dubia	hairypink	PEDU	NNF
Plantago coronopus	cut-leaved plantain	PLCO	NNF
Polypogon monspeliensis	rabbitsfoot grass	POMO	NNF
Pseudognaphalium stramineum	cotton-batting plant	PSST	NP
Quercus agrifolia	coast live oak	QUAG	NP
Rumex salicifolius	willow leaved dock	RUSA	NP
Salix lasiolepis	arroyo willow	SALA6	NP
Salvia mellifera	black sage	SAME	NP
Sanicula laciniata	coast sanicle	SALA7	NP
Senecio glomeratus	cutleaf burnweed	SEGL	NNF
Sisyrinchium bellum	western blue-eyed grass	SIBE	NP
Sonchus asper	prickly sow thistle	SOAS	NNF
Sonchus oleraceus	common sow thistle	SOOL	NNF
Stipa pulchra	purple needle grass	STPU	NP
Tribolium obliterum	Capetown grass	TROB	NNF
Trifolium angustifolium	narrow-leaved clover	TRAN	NNF
Trifolium campestre	hop clover	TRCA	NNF
Trifolium dubium	little hop clover	TRDU	NNF
Trifolium hirtum	rose clover	TRHI	NNF
Vicia sativa ssp. *nigra*	narrow-leaved vetch	VISAN	NNF
Vicia sativa ssp. *sativa*	spring vetch	VISAS	NNF

* HMP species

9.11.2.3 Vegetative Cover

Burleson surveyed ten 50-meter line-intercept transects and 30 associated quadrats at HA 34. These surveys indicated that the mean vegetative cover by native shrubs and perennials was 56.72%. The mean vegetative cover by native shrubs and perennials was greater in 2022 than in 2019 by 0.32%. Quadrats were completed along the transect line when 10% or more of the transect line was herbaceous cover, in accordance with the Monitoring Protocol (Burleson, 2009a). Quadrats were completed for five transects (T02, T05, T06, T09 and T10) at HA 34. Table 9-75 summarizes vegetative cover, Table 9-76 presents vegetative cover by species, and Table 9-77 presents quadrat results. Figure 9-21 presents the percent cover of dominant species at HA 34 in 2016, 2017, 2018, 2019, and 2022.

Table 9-75. Transect Survey Summary for HA 34

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA34T01	60.06	60.06	0.00	97.30	2.32
HA34T02	30.78	18.82	11.58	97.92	2.08
HA34T03	43.04	34.34	8.70	77.08	21.12
HA34T04	91.40	87.56	3.32	98.02	1.40
HA34T05	50.72	40.36	7.52	98.78	1.22
HA34T06	111.24	75.70	35.34	99.74	0.26
HA34T07	64.92	62.36	1.14	97.44	2.56
HA34T08	82.18	73.36	6.36	97.98	2.02
HA34T09	105.94	92.72	12.40	100.00	0.00
HA34T10*	36.04	21.88	12.76	99.76	0.24
SITE AVERAGE	**67.63**	**56.72**	**9.91**	**96.40**	**3.32**

*Transect HA34T10 was added in 2022.

Table 9-76. Transect Survey Results for HA 34 by Species

Transect	ACAMA (%)	ACGL (%)	ACMI (%)	ACST (%)	ADFA (%)	AICA (%)	ARCA (%)	ARHO* (%)	AVBA (%)	BAPI (%)	BRDI (%)
HA34T01	0.00	31.72	0.00	0.00	0.00	0.00	18.52	0.00	0.00	9.16	0.00
HA34T02	0.00	12.32	0.00	0.38	0.36	0.00	0.00	0.00	0.00	4.02	0.88
HA34T03	0.00	20.24	0.00	0.00	1.96	0.28	2.36	0.00	4.22	3.04	0.00
HA34T04	0.00	27.40	0.00	0.00	0.00	2.26	12.32	0.00	0.00	33.16	0.00
HA34T05	2.04	18.82	0.00	0.00	0.58	2.84	2.04	0.98	0.00	10.30	0.00
HA34T06	0.00	8.40	0.00	0.00	0.00	0.00	1.14	0.00	4.90	0.00	1.02
HA34T07	1.42	40.10	0.00	0.00	0.00	0.00	5.70	0.00	0.00	14.52	0.00
HA34T08	1.10	27.38	0.00	0.26	0.00	0.52	8.40	0.00	0.00	9.54	0.00
HA34T09	0.82	36.56	1.22	0.00	0.00	1.52	5.38	0.00	0.00	17.20	0.00
HA34T10	0.28	12.08	0.32	0.00	0.30	2.26	0.00	0.00	0.00	1.58	0.00
SITE AVERAGE	**0.57**	**23.50**	**0.15**	**0.06**	**0.32**	**0.97**	**5.59**	**0.10**	**0.91**	**10.25**	**0.19**

* HMP species

Table 9-76 (continued). Transect Survey Results for HA 34 by Species

Transect	BRHO (%)	BRMA (%)	CEME (%)	CRSC (%)	DECO (%)	DIAU (%)	ELGL (%)	ERER (%)	FEBR (%)	FEMY (%)	GAPO (%)
HA34T01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HA34T02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HA34T03	0.00	0.00	0.00	1.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00
HA34T04	0.00	0.00	0.00	0.00	0.00	0.28	1.08	2.56	0.00	1.06	0.52
HA34T05	0.00	0.00	0.00	0.00	0.00	1.62	2.76	0.00	0.00	0.00	0.00
HA34T06	0.00	0.00	0.26	0.00	0.00	0.00	61.50	0.00	0.58	0.00	0.00
HA34T07	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.00	0.00	0.00	0.00
HA34T08	0.00	0.00	0.00	0.00	0.82	0.00	2.02	0.00	0.00	0.00	0.00
HA34T09	0.00	0.00	0.00	0.00	0.00	2.16	1.58	0.00	0.00	8.92	0.00
HA34T10	0.46	0.20	0.00	0.00	0.00	0.00	2.98	0.00	0.00	8.10	0.00
SITE AVERAGE	**0.05**	**0.02**	**0.03**	**0.10**	**0.08**	**0.46**	**7.25**	**0.26**	**0.06**	**1.81**	**0.05**

Table 9-76 (continued). Transect Survey Results for HA 34 by Species

Transect	HEAR (%)	HOCU (%)	HYGL (%)	LUAR (%)	LUCO (%)	LYAR (%)	MAGR (%)	MASA (%)	MEPO (%)	PLCO (%)	QUAG (%)
HA34T01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HA34T02	0.00	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HA34T03	0.00	3.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.00
HA34T04	0.00	6.08	0.00	3.60	0.00	0.00	0.00	0.00	0.00	0.00	1.08
HA34T05	0.22	0.54	0.00	0.00	0.00	0.00	0.00	0.80	0.00	2.22	0.00
HA34T06	0.00	0.00	0.20	3.02	0.00	0.00	0.00	0.20	2.36	0.00	0.00
HA34T07	0.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HA34T08	0.00	6.88	0.28	8.98	0.28	0.00	0.00	0.00	0.00	4.80	0.00
HA34T09	0.00	10.66	0.52	0.00	0.00	1.24	0.00	0.00	0.00	0.20	0.00
HA34T10	0.00	0.44	0.00	0.00	0.00	0.00	1.12	0.00	0.00	0.40	0.00
SITE AVERAGE	**0.02**	**2.93**	**0.10**	**1.56**	**0.03**	**0.12**	**0.11**	**0.10**	**0.24**	**0.85**	**0.11**

Table 9-76 (continued). Transect Survey Results for HA 34 by Species

Transect	RUAC (%)	SAME (%)	STPU (%)	TODI (%)	TRAN (%)	TRCA (%)	TRDU (%)	VISA (%)	TH (%)	BG (%)
HA34T01	0.00	0.00	0.66	0.00	0.00	0.00	0.00	0.00	97.30	2.32
HA34T02	0.00	0.00	1.80	0.00	10.70	0.00	0.00	0.00	97.92	2.08
HA34T03	0.00	0.24	0.94	0.00	2.96	0.32	0.00	0.00	77.08	21.12
HA34T04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	98.02	1.40
HA34T05	0.00	0.00	2.50	0.00	2.46	0.00	0.00	0.00	98.78	1.22
HA34T06	0.00	0.00	1.64	0.00	21.36	0.00	0.00	4.66	99.74	0.26
HA34T07	0.00	0.00	1.04	0.00	1.14	0.00	0.00	0.00	97.44	2.56
HA34T08	0.56	4.94	5.22	0.00	0.20	0.00	0.00	0.00	97.98	2.02
HA34T09	0.00	0.00	15.06	2.90	0.00	0.00	0.00	0.00	100.00	0.00
HA34T10	0.00	0.00	4.18	0.00	0.50	0.00	0.84	0.00	99.76	0.24
SITE AVERAGE	**0.06**	**0.52**	**3.30**	**0.29**	**3.93**	**0.03**	**0.08**	**0.47**	**96.40**	**3.32**

Table 9-77. Quadrat Summary for HA 34 Transects T02, T05, T06, T09 and T10

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA34T02Q01	80	65	1	14	20	0
HA34T02Q02	36	4	0	32	49	15
HA34T02Q03	28	9	0	19	57	15
HA34T02Q04	27	12	0	15	63	10
HA34T02Q05	16	4	0	12	54	30
HA34T02Q06	14	8	0	6	36	50
HA34T05Q01	13	4	2	7	37	50
HA34T05Q02	13	4	0	9	20	71
HA34T05Q03	63	63	0	0	36	1
HA34T05Q04	38	5	1	32	60	2
HA34T05Q05	28	10	4	14	59	13
HA34T05Q06	28	21	2	5	32	40
HA34T06Q01	22	10	1	11	75	3
HA34T06Q02	52	22	0	30	46	2
HA34T06Q03	15	4	0	11	63	22
HA34T06Q04	55	42	1	12	40	5
HA34T06Q05	36	3	2	31	60	4
HA34T06Q06	84	82	0	2	15	1
HA34T09Q01	77	74	0	3	13	10
HA34T09Q02	48	43	2	3	32	20
HA34T09Q03	39	27	2	10	31	30
HA34T09Q04	70	65	0	5	27	3
HA34T09Q05	11	5	0	6	86	3
HA34T09Q06	23	20	0	3	75	2
HA34T10Q01	32	0	0	32	68	0
HA34T10Q02	46	13	0	33	51	3
HA34T10Q03	20	7	2	11	68	12
HA34T10Q04	27	4	4	19	61	12
HA34T10Q05	29	25	0	4	28	43
HA34T10Q06	20	17	1	2	38	42
Site Average	**36**	**22**	**1**	**13**	**47**	**17**

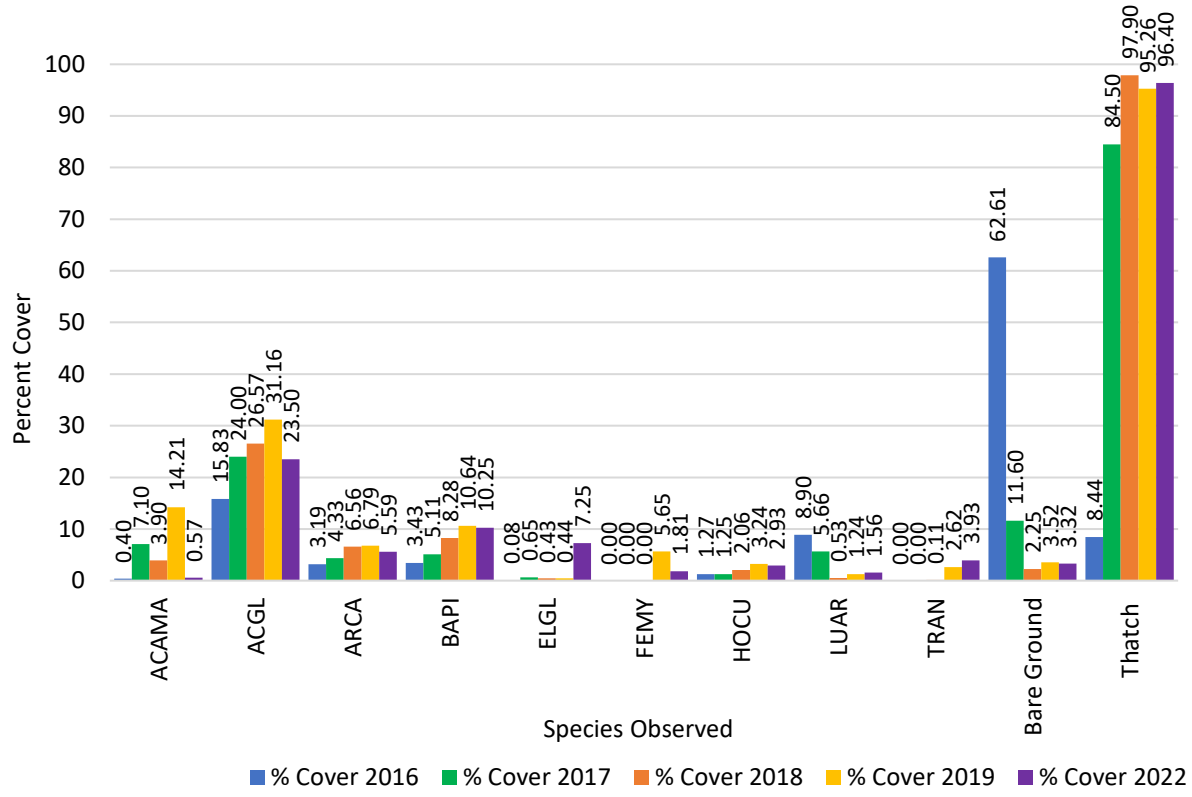


Figure 9-21. Percent Cover of Dominant Species at HA 34 in 2016, 2017, 2018, 2019, and 2022.

9.11.3 Monitoring Results Discussion

9.11.3.1 Plant Survivorship

Plant survivorship was moderate for the 2016 planting and low for the 2017, 2019, 2021, and 2022 planting events at HA 34. For plant survivorship classifications of each species by planting year, see Table 9-78. Low survivorship for lupine species has been seen at other sites where plant survivorship monitoring occurred; however, there are species (i.e. chamise and black sage) that had low survivorship at HA 34 that had higher survivorship elsewhere. The low plant survivorship is likely due to site conditions that are not conducive to plant growth. HA 34 lacks topsoil and is highly compacted; these factors contribute to sheet flow and inhibit water infiltration. 2016 plantings showed higher survivorship for some species compared to other years, but an explanation for this remains inconclusive. Planting locations in 2016 were also used in subsequent years, therefore the soil type was not unique. July to June precipitation totals for 2015-2016, 2016-2017, and 2018-2019 rain years were relatively similar at 24.00 inches, 25.32 inches, and 24.81 inches respectively (NPSDM, 2023). The sample size of individuals planted and monitored was smaller in 2016 than 2017 and 2019, and this could contribute to less representative survivorship percentages, however, at least 10% of planted individuals were monitored for survivorship in all years.

Several areas at HA 34 were mulched which should prevent erosion and help with water retention (Kemron, 2018). The 2021 planting will be monitored for one more year. The 2022 planting will be monitored for two more years.

Table 9-78. Plant Survivorship Classifications for All Planting Years at HA 34

Species	Planting Year				
	2016	2017	2019	2021	2022
ADFA	high	low	low	low	moderate
ARCA	moderate	low	low	moderate	low
ARHO*	moderate	low	low	low	low
ARMO*	moderate	low	low	low	low
ARTO	low	low	low	low	low
BAPI	high	high	low	moderate	low
CERI*	low	low	low	low	low
FRCA	-	-	low	-	-
GAEL	-	-	low	-	-
LECA	-	-	low	-	-
LUAL	-	low	-	-	-
LUAR	low	low	low	low	low
SAME	high	low	low	low	low

*HMP Species

9.11.3.2 Species Richness

Chamise, Monterey manzanita, shaggy-bark manzanita, Hooker's manzanita, Monterey ceanothus, sticky monkeyflower, and black sage were present. HA 34 included 30 native shrub and perennial species and met the success criterion for Objective 1.

9.11.3.3 Vegetative Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For Objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 18 shrub and perennial species presented in Table 2 of the HA 34 SSRP (Burleson, 2013). These species contributed 56.04% cover to the HA, an increase of 0.87% since 2019. This success criterion was met (see Figure 9-22).

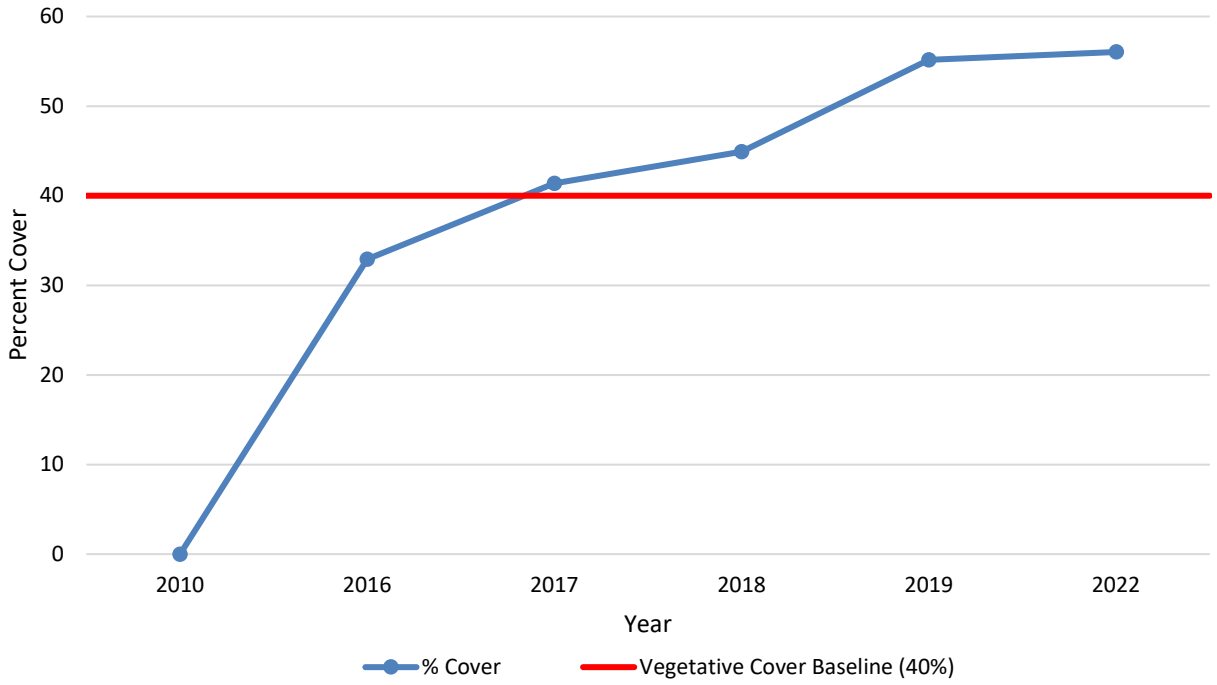


Figure 9-22. Native Vegetative Cover Compared to the Success Criterion at HA 34

Objective 2 considers the percent cover of non-native target weeds. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded a cover class of 2. Cover class 2 ranges from 1-5% of absolute cover. The HMP shrub species at HA 34 provided an absolute cover of 0.10%; therefore, the HA did not meet this success criterion. This was a slight decrease from 0.11% in 2019. The second success criterion is no net loss of HMP shrubs. For HA 34, this means a vegetative cover average of at least 1% cover for Monterey manzanita, 1% for Monterey ceanothus, and 1% for Hooker's manzanita. The average vegetative cover for Monterey manzanita was 0.00%, Monterey ceanothus was 0.00%, and Hooker's manzanita was 0.10% (see Figure 9-23). The success criterion was not met.

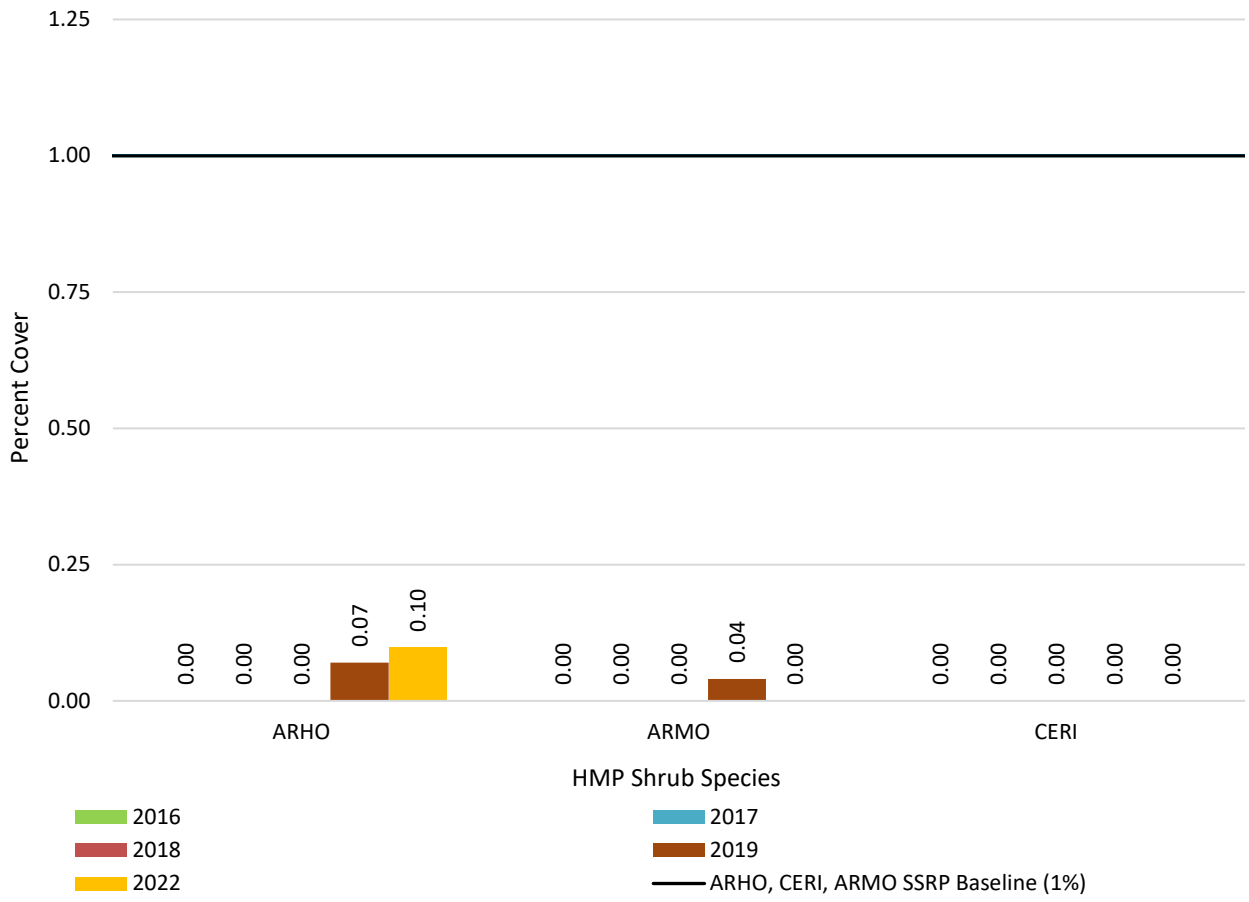


Figure 9-23. HMP Shrub Species Comparison to Success Criteria at HA 34

9.11.4 HA Status Discussion

HA 34 was in year 8 of monitoring in 2022 and responded variably to restoration efforts. The site met three of five success criteria in 2019 (year 5 of monitoring) and 2022. Per recommendations in the 2019 Annual Report, the Army implemented three actions to support HA 34 in achieving success criteria in future years: 1) continue erosion control efforts, including the use of mulch (mulch was applied to plants being installed on top of the hillside); 2) fulfill SSRP prescriptions to support HMP shrub criteria (Hooker's manzanita, Monterey manzanita, and Monterey ceanothus were planted in the 2020/2021, 2021/2022, and 2022/2023 seasons); and 3) reevaluate success criteria of HMP shrub cover and cover by species.

The HMP shrub cover and cover by species success criteria were revised in 2020. Under the revised success criteria: HMP shrub cover class was reduced from three to two; HMP shrub cover by species was reduced for Monterey manzanita, Monterey ceanothus, and Hooker's manzanita from 31%, 7%, and 4% percent respectively, to equal or greater than 1% for each species; and future plantings of the HMP shrub species will be concentrated in areas of the site that have shown good recovery and better soil conditions (USFWS, 2020). The updated success criteria are reflected in Tables 9-66 and 9-79.

Per recommendations in the 2020 Annual Report, an additional monitoring transect (HA34T10) was installed in spring 2022 prior to monitoring to obtain data representative of the site's condition in the

area deemed suitable for planting HMP shrub species (see Figure 9-20). Furthermore, the access road was restored by installing plants, applying seed and straw, and installing control features. The Army has no further recommendations at this time. SSRP planting of HMP shrubs occurred since the site was last monitored and needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-12 and Appendix F, page F-2).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2027 (see Table 9-65). Table 9-79 summarizes the status of HA 34 meeting success criteria at year 5 and 8 and the likelihood of meeting criteria by year 13.

Table 9-79. Status for Achieving Success Criteria at HA 34

Success Criterion	Category	Acceptable Limits	Year 5 (2019) Met	Year 8 (2022) Met	Likelihood of Achieving Success by Year 13 (2027)	Notes
Objective 1 – No. 1	Species richness	7 required species: ADFA, ARMO, ARTO, ARHO, CERI, DIAU, SAME	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	Yes	Yes	HIGH	**Year 5**: 55.17% **Year 8**: 56.04%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover‡	Cover class 2: 1-5%	No	No	LOW	**Year 5**: 0.11% **Year 8**: 0.10% (ARMO, CERI, and ARHO were planted in 2020/2021, 2021/2022, and 2022/2023)
Objective 3 – No. 4	HMP shrub cover by species‡	ARMO ≥ 1% CERI ≥ 1% ARHO ≥ 1%	No	No	LOW for ARMO LOW for CERI LOW for ARHO	**Year 5:** ARMO 0.04% CERI 0.00%% ARHO 0.07% **Year 8:** ARMO 0.00% CERI 0.00% ARHO 0.10% (ARMO, CERI, and ARHO were planted in 2020/2021, 2021/2022, and 2022/2023)
Objective 3 – No. 4	HMP annual density	NA	NA	NA	NA	NA

‡ Success criteria modified by USFWS (USFWS, 2020)

9.12 HA 36

HA 36 was used by the Army as a grenade and explosive ordnance disposal range. Soil remediation was completed in 2010; 2,750 cubic yards of soil were excavated from 0.5 acres (Shaw, 2008). HA 36 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 36 is relatively flat with an east aspect. Adjacent lands are disturbed central maritime chaparral.

HA 36 is located on the northeastern portion of Site 39, occurring within the Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 36 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 36 has some potential for erosion.

Restoration at HA 36 occurred in 2011, 2012, 2016, 2018, 2019, 2020, 2022, and 2023. Quantitative monitoring began in 2016. HA 36 was monitored for 12 years by photo documentation and site visits and four years for species richness and vegetative cover (see Table 9-80). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-24 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 36 are summarized in Table 9-81.

Table 9-80. Historic Summary of Restoration and Monitoring Activities at HA 36

Activity	Monitoring Years													
			1	2	3	4	5	6	7	8	9	10	11	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2025
Restoration: Active, Passive, and Erosion Control	●	●				●		●	●	●		●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Species Richness						●	●	●		●				●
Vegetative Cover						●	●	●		●				●

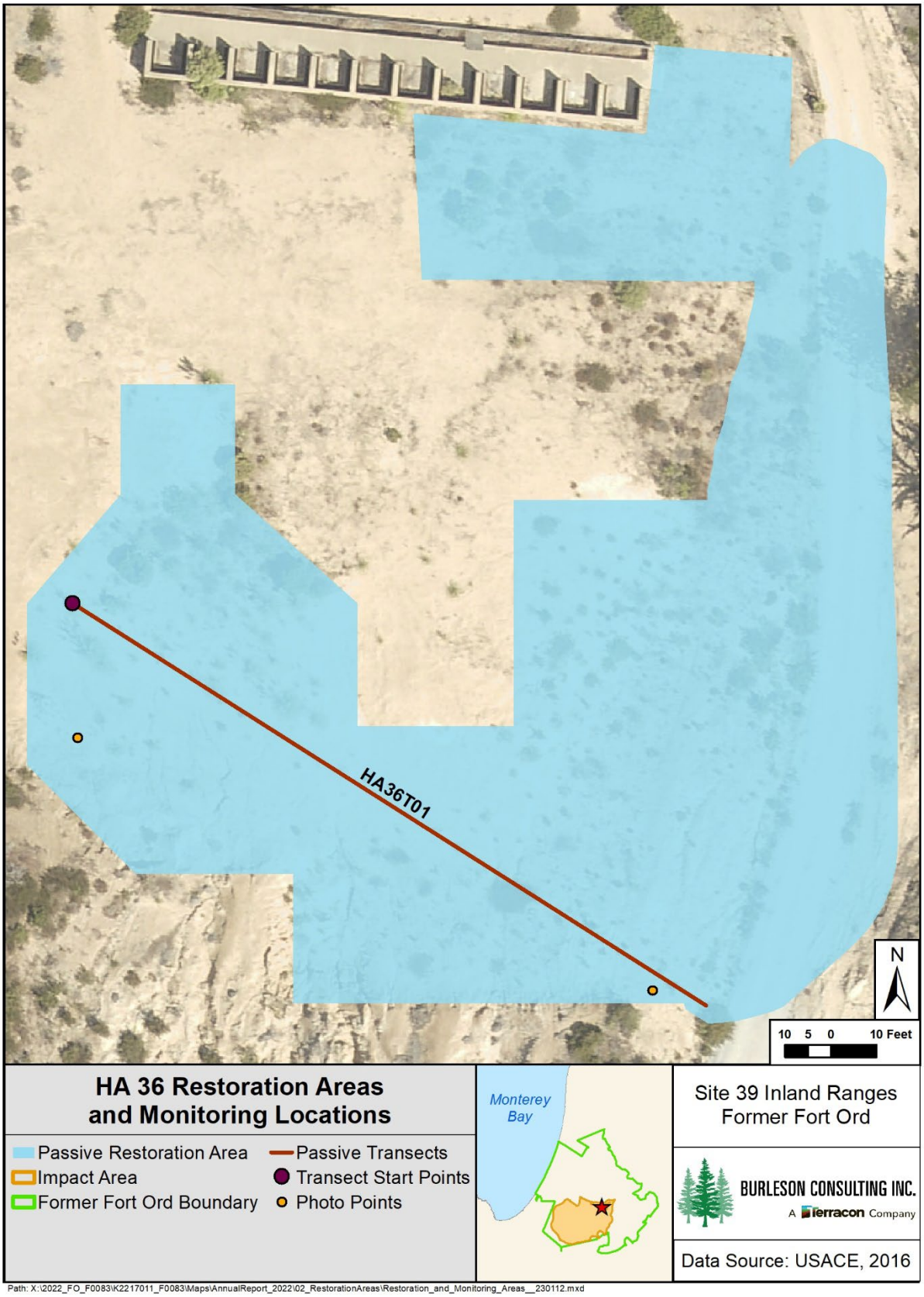


Figure 9-24. HA 36 Restoration Areas and Monitoring Locations Map

Table 9-81. Success Criteria and Acceptable Limits for Restoration of HA 36

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise sandmat manzanita† Monterey manzanita† shaggy-bark manzanita coyote brush Monterey ceanothus† golden yarrow peak rush-rose wedge-leaved Horkelia deerweed black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 9.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 12.
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1.
			Eastwood’s goldenbush percent cover, as an average of transect data, must be equal or greater than 1.

Table 9-81. Success Criteria and Acceptable Limits for Restoration of HA 36

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Density class: Not applicable

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.12.1 Restoration Activities

Burleson performed passive restoration at HA 36 in 2012, 2016, 2018, 2019, 2020, and 2022. The total amount of seed broadcast on site was 47.708 lb compared to the 12.775 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-82 summarizes the SSRP seed target and the amount of seed applied by year and species. In 2017, Base Realignment and Closure (BRAC) broadcast approximately 5 lb of production seed and completed some minor erosion control repairs.

Table 9-82. Summary of Passive Restoration Activities for HA 36

Species	Pounds of Seed Broadcast								
	SSRP Target	2012 (Jan)	2012 (Dec)	2016	2018	2019	2020	2022	Total by Species
ACMI	-	-	-	0.900	1.200	0.300	4.400	0.400	7.200
ACGL	1.000	0.500	0.507	1.800	-	-	4.800	0.800	8.407
ADFA	0.500	0.300	0.254	-	-	-	-		0.554
ARHO*	1.000	0.500	0.518	-	-	-	-		1.018
ARMO*	1.000	0.500	0.507	-	-	-	-		1.007
ARPU*	0.500	0.300	0.263	-	-	-	-		0.563
ARTO	1.000	0.500	0.514	-	-	-	-		1.014
BAPI	0.075	-	0.037	-	-	-	-		0.037
CERI*	0.500	-	0.252	-	-	-	-		0.252
CRSC	0.500	0.300	0.251	-	-	-	-		0.551
ELGL	-	-	-	1.800	4.000	1.200	1.000	1.000	9.000
ERCO	0.150	0.077	0.077	-	-	-	-		0.154
ERFA*	0.050	0.025	0.064	-	-	-	-		0.089
FRCA	0.500	0.300	0.251	-	-	-	-		0.551
HOCU	1.000	0.500	0.500	1.800	1.600	0.400	-		4.800
HO	4.500	-	4.510	-	1.200	0.600	-		6.310
SAME	0.500	0.300	0.251	-	-	-	-		0.551
STPU	-	-	-	1.100	2.500	0.750	0.300	1.000	5.650
TOTAL	**12.775**	**4.102**	**8.756**	**7.400**	**10.500**	**3.250**	**10.500**	**3.200**	**47.708**

* HMP species

No active restoration was prescribed at HA 36 however, AMP planting events occurred in 2020 and 2022 per recommendations made in the 2017 Annual Report (Burleson, 2018). A total of 834 plants were

installed at HA 36. Table 9-83 summarizes the plants installed during active restoration. Additionally, BRAC staff installed approximately 300 surplus plants in 2014 and 100 surplus plants in 2017.

Table 9-83. Summary of Active Restoration Activities for HA 36

Species	Number of Individual Plants			
	2020	2022	2023	Total by Species
ACGL	80	-	-	80
ACMI	10	-	-	10
ADFA	37	-	-	37
ARCA	29	-	-	29
ARHO*	50	-	-	50
ARMO*	59	-	59	118
ARPU*	17	50	-	67
ARTO	60	-	-	60
BAPI	23	-	-	23
CERI*	37	-	60	97
CRSC	56	-	-	56
DIAU	50	-	-	50
ERFA*	-	75	-	75
HOCU	76	-	-	76
LUAR	50	-	-	50
SAME	75	-	-	75
TOTAL	**709**	**125**	**119**	**953**

*HMP species

9.12.2 Monitoring Results

HA 36 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-13).

9.12.3 HA Status Discussion

In 2017, year 5 of monitoring, HA 36 met one of five success criteria. In 2020, year 8 of monitoring, the site met two of five success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 33 has a low chance of meeting native vegetation cover and HMP shrub cover by species criteria, and a moderate chance of meeting the absolute HMP shrub cover criterion (see Table 9-84).

Recommendations were developed from a combination of prior recommendations and restoration efforts. Per recommendations in the 2017 Annual Report, Hooker's manzanita, Monterey manzanita, and Monterey ceanothus were planted in the 2019/2020 season and sandmat manzanita and Eastwood's goldenbush were planted in the 2021/2022 planting season (Burleson, 2018). An additional planting of Monterey manzanita and Monterey ceanothus occurred in the 2022/2023 planting season. The Army recommends additional seed broadcast in barren areas to address the native vegetation cover criterion. HA 36 was last monitored in 2020 and AMP planting occurred in the 2021/2022 and 2022/2023 wet seasons. The site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-13).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in year 13, 2025 (see Table 9-80).

Table 9-84. Status for Achieving Success Criteria at HA 36

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	11 required species: ADFA, ARPU, ARMO, ARTO, BAPI, CERI, ERCO, CRSC, HOCU, ACGL, SAME	Yes	Yes	HIGH	**Year 5:** met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	LOW	**Year 5**: 16.08% **Year 8**: 5.98% (ACGL cover decreased by 10.62% from 2017 to 2020)
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	No	Yes	HIGH	**Year 5**: 5.42% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	No	No	MODERATE	**Year 5**: 0.00% **Year 8**: 2.82% (AMP planting occurred in 2021/22 and 2022/23)
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥2% ARMO ≥ 9% CERI ≥ 12% ARHO ≥ 1% ERFA ≥ 1%	No	No	LOW for ARPU LOW for ARMO LOW for CERI HIGH for ARHO LOW for ERFA	**Year 5**: ARPU 0.00% ARMO 0.00% CERI 0.00% ARHO 0.00% ERFA 0.00% **Year 8**: ARPU 0.00% ARMO 0.00% CERI 0.00% ARHO 2.82% ERFA 0.00% (AMP planting occurred in 2021/22 and 2022/23
Objective 3 – No. 4	HMP annual density	NA	NA	NA	NA	NA

9.13 HA 37

HA 37 was used by the Army as a short distance firing range, bazooka range, and rifle grenade range. An estimated total of 19,500 cubic yards of soil were excavated over approximately 11.2 acres. HA 37 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 37 is relatively flat and surrounded by low to very high-quality habitat with documented occurrences of California tiger salamander on the range.

HA 37 is located on the northeastern portion of Site 39, within the Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 37 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and installing native container-grown plants. HA 37 has some potential for erosion.

Restoration at HA 37 occurred from 2013 to 2022 and quantitative monitoring began in 2014. HA 37 was monitored for 10 years by photo documentation and site visits; seven years for HMP annual density in plots; six years for HMP annual density across the HA; five years for species richness and vegetative cover; and nine years for plant survivorship (see Table 9-85). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-25 shows the HA footprint, restoration areas, and transect survey locations. Success criteria for HA 37 are summarized in Table 9-86.

Table 9-85. Historic Summary of Restoration and Monitoring Activities at HA 37

Activity	Monitoring Years										
			1	2	3	4	5	6	7	8	13
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2027
Restoration: Active, Passive, and Erosion Control	●	●	●	●	●	●	●	●	●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●		●	
HMP Annual Density across HA				●	●	●	●	●		●	
Species Richness				●	●	●	●			●	●
Vegetative Cover				●	●	●	●			●	●
Plant Survivorship		●	●	●	●	●	●	●	●	●	

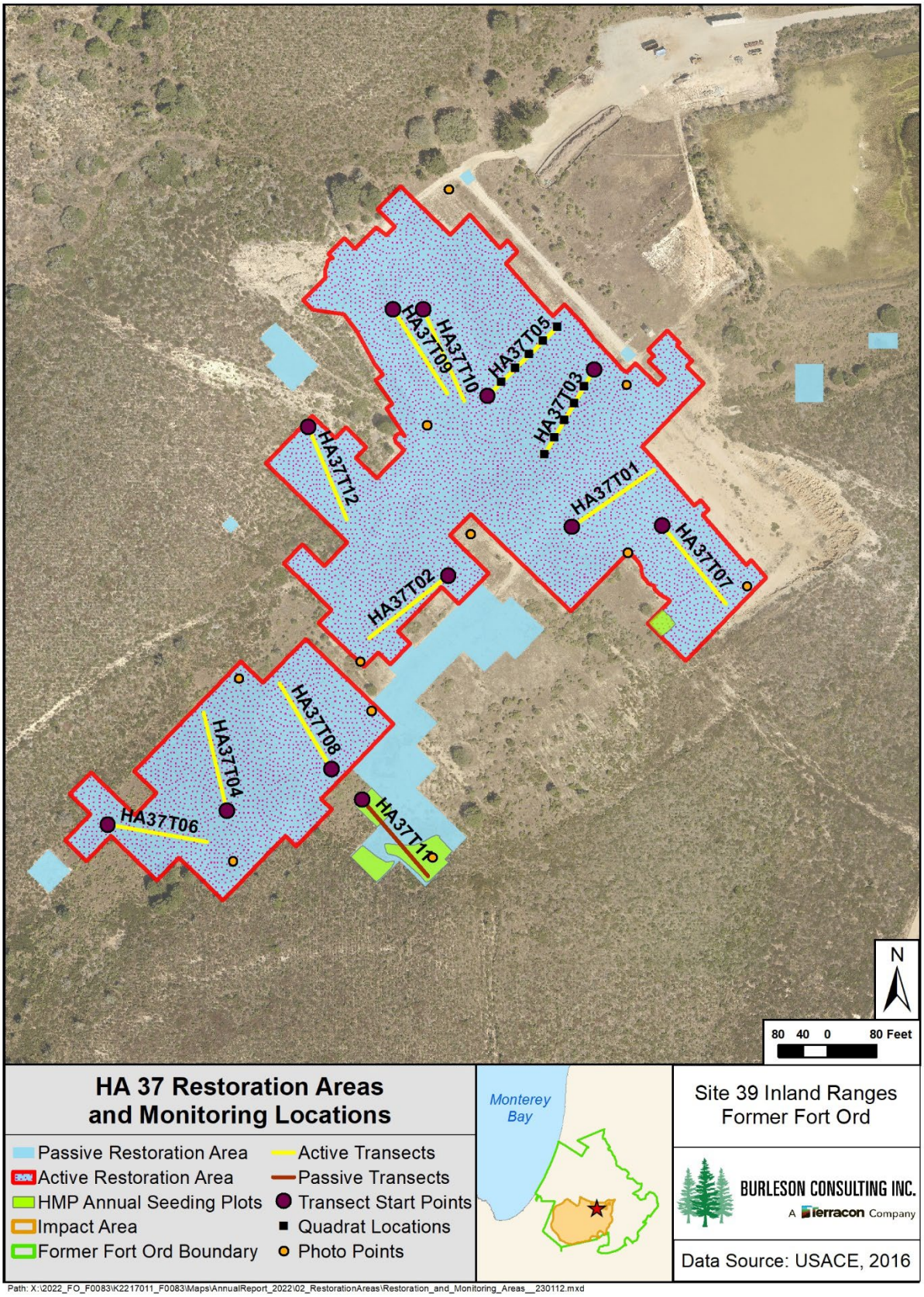


Figure 9-25. HA 37 Restoration Areas and Monitoring Locations Map

Table 9-86. Success Criteria and Acceptable Limits for Restoration of HA 37

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			shaggy-bark manzanita chamise black sage coast silk tassel Monterey manzanita† Monterey ceanothus† sandmat manzanita† coyote brush Hooker's manzanita†
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicates presence of non-native target weed species jubata grass, broom (*Genista* sp.), and ice plant. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 4.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 2.
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1.
			Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2.

Table 9-86. Success Criteria and Acceptable Limits for Restoration of HA 37

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

9.13.1 Restoration Activities

Burleson performed passive restoration at HA 37 each year from 2014 to 2022. The total amount of seed broadcast on site was 964.28 lb compared to 247.00 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-87 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower. Four plots were chosen in the HA because they had suitable habitat for Monterey spineflower and adjacent populations (see Figure 9-25).

Table 9-87. Summary of Passive Restoration Activities for HA 37

Species	Pounds of Seed Broadcast											
	SSRP Target	2014 (Jan)	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total by Species
ACMI	9.40	4.80	2.00	8.07	8.14	8.70	1.80	2.95	17.60	0.40	2.90	57.36
ACGL	18.70	8.70	4.00	10.34	16.10	5.90	-	1.50	20.80	0.65	5.80	73.79
ADFA	-	3.30	-	-	-	-	-	-	-	-	-	3.30
ARCA	-	-	-	2.40	-	-	-	-	-	-	-	2.40
BAPI	1.40	1.40	0.32	0.52	-	0.15	-	0.08	0.12	0.02	-	2.61
CERI*	9.40	-	2.00	2.67	-	1.00	-	0.50	0.80	0.15	-	7.12
CHPUP*	1.40	-	0.32	0.04	-	-	-	-	1.04	1.04	-	2.44
CRSC	7.00	5.20	1.52	2.60	-	0.75	-	0.38	0.60	0.11	-	11.16
DIAU	1.40	0.10	0.32	0.28	-	0.15	-	0.08	0.12	0.02	-	1.07
ELGL	28.10	100.00	69.00	69.01	19.58	40.74	7.20	6.70	28.80	1.30	10.85	353.18
ERCO	11.70	5.00	1.44	1.06	-	1.25	-	0.63	1.00	0.19	-	10.57
ERER	-	4.20	-	-	-	-	-	-	-	-	-	4.20
ERFA*	1.90	-	1.40	0.05	-	0.20	-	0.10	0.16	0.03	-	1.94
GAEL	-	-	-	-	-	1.00	-	0.50	-	0.15	-	1.65
HO	93.50	50.00	20.00	52.70	3.12	113.00	3.60	5.00	8.00	2.10	5.40	262.92
HOCU	18.70	16.10	47.60	5.34	16.10	5.40	2.40	1.53	-	0.30	-	94.77
LUAR	-	-	1.52	2.40	-	-	-	-	-	-	-	3.92
LUCH/LUAL	7.00	-	-	-	-	0.75	-	0.38	0.60	0.11	-	1.84
LUNA	-	-	-	0.27	-	1.00	-	0.28	1.02	0.15	-	2.72
SAME	18.70	7.10	4.00	2.94	-	2.00	-	1.00	1.60	0.30	-	18.94
STCE	-	-	-	0.54	-	2.00	-	-	-	-	-	2.54
STPU	18.70	-	-	5.34	10.10	9.75	4.50	5.25	-	1.20	7.70	43.84
TOTAL	**247.00**	**205.90**	**155.44**	**166.57**	**73.14**	**193.74**	**19.50**	**26.86**	**82.26**	**8.22**	**32.65**	**964.28**

* HMP species

Active restoration was conducted in 2014, 2015, 2016, 2017, 2020, 2021, and 2022. The total number of plants installed at HA 37 was 19,938 compared to 17,300 prescribed in the SSRP. Table 9-88 summarizes the plants installed during active restoration.

Table 9-88. Summary of Active Restoration Activities in HA 37

Species	Number of Individual Plants								
	SSRP Target	2014	2015	2016	2017	2020	2021	2022	Total by Species
ACMI	800	13	252	244	171	35	40	15	770
ACGL	1,000	380	208	213	20	33	100	19	973
ADFA	1,700	636	363	316	140	118	100	40	1,713
ARCA	-	-	-	-	155	24	-	-	179
ARHO*	700	234	325	270	157	19	71	11	1,087
ARMO*	1,000	389	370	141	206	33	161	19	1,319
ARPU*	1,000	-	100	220	237	25	129	15	726
ARTO	2,500	621	554	497	356	95	279	52	2,454
BAPI	800	234	284	431	329	71	80	25	1,454
CERI*	1,000	315	652	239	140	32	128	19	1,525
CRSC	1,000	389	208	22	286	33	100	29	1,067
DIAU	800	389	250	437	380	34	100	19	1,609
ERCO	500	311	182	-	227	25	80	15	840
FRCA	-	-	-	-	-	7	-	10	17
GAEL	500	-	-	17	2	25	80	15	139
HOCU	1,000	389	258	32	395	33	100	19	1,226
LECA	-	-	-	-	-	20	-	-	20
LUCH/LUAL	1,000	-	165	146	242	33	100	19	705
LUAR	1,000	208	243	175	262	33	100	26	1,047
SAME	1,000	362	250	15	258	40	120	23	1,068
TOTAL	**17,300**	**4,870**	**4,664**	**3,415**	**3,963**	**768**	**1,868**	**390**	**19,938**

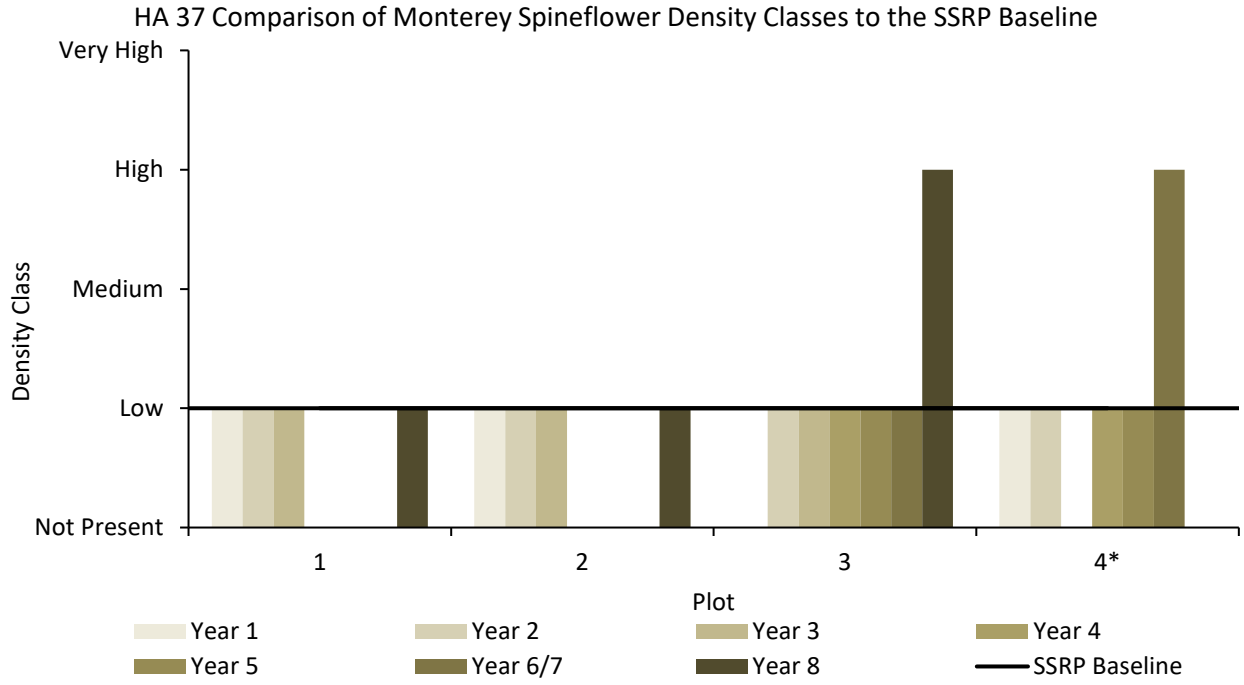
* HMP species

9.13.2 Monitoring Results

9.13.2.1 HMP Annual Density

Monterey spineflower restoration plots were monitored for density at HA 37.

Four Monterey spineflower restoration plots were monitored for year 7 (Plot 4) and year 8 (Plots 1-3) density at HA 37 in 2022. The plots are numbered 1-4 on Figure 9-27 and are located throughout HA 37. Monterey spineflower density was low at Plots 1 and 2 and high at Plots 3 and 4. Figure 9-26 represents Monterey spineflower restoration plot densities for HA 37.



* Plot 4 was established in Nov 2015 and has only been monitored for years 1-7.

Figure 9-26. HA 37 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-4

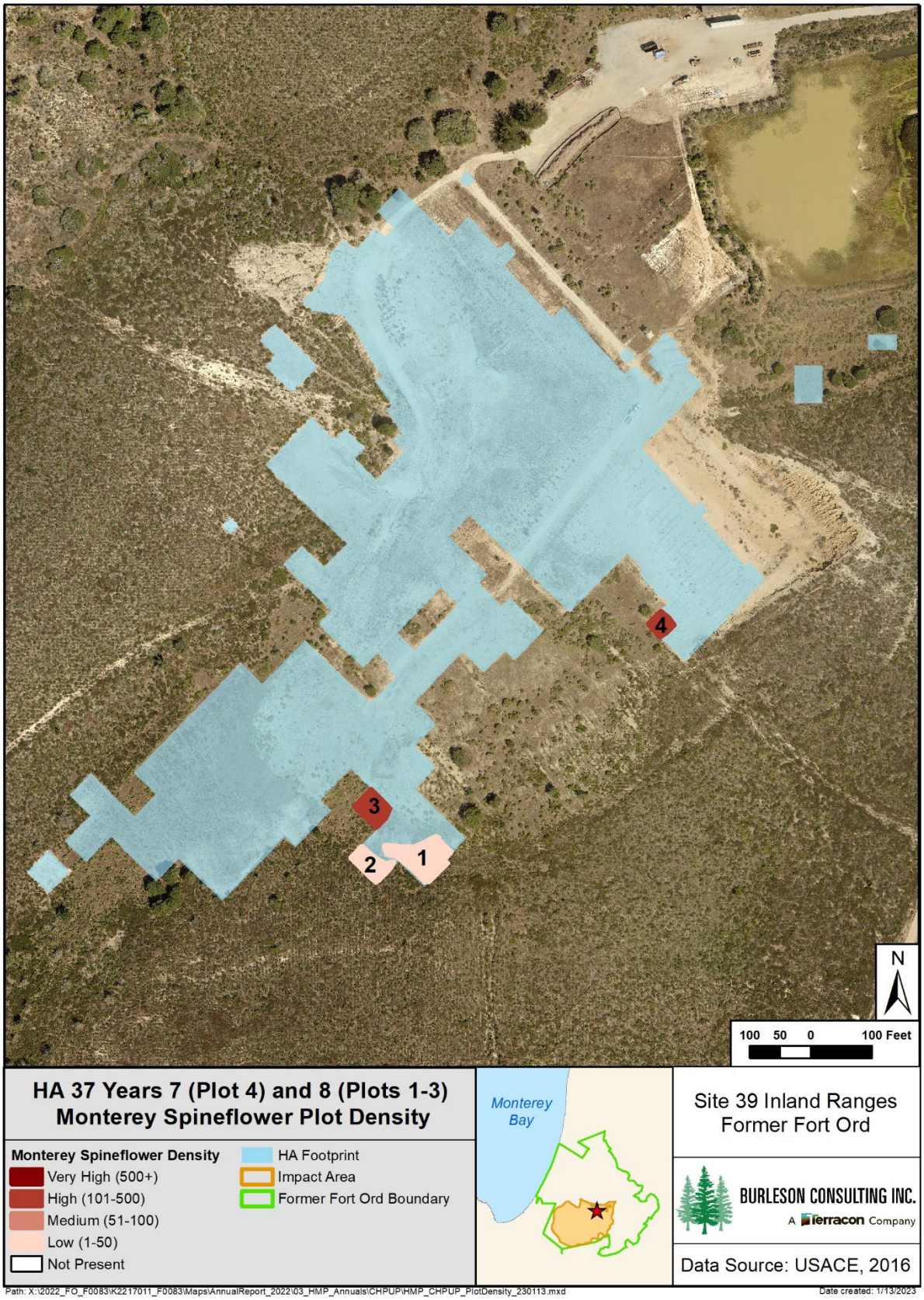


Figure 9-27. HA 37 Year 7 (Plot 4) and Year 8 (Plots 1-3) Monterey Spineflower Plot Density Map

HMP annual density monitoring includes mapping discrete patches of HMP annuals within the restoration site but outside of the HMP annual restoration plots. This survey was completed for Monterey spineflower at HA 37.

Forty-four individual plants and seven discrete patches of Monterey spineflower were mapped and individual plants were counted within the patch (see Figure 9-28). The density ranged from low to high and the total acreage of Monterey spineflower patches with a density at or above the SSRP baseline density class of low was 0.039 acres. From 2020 to 2022, the density range and the acreage above the SSRP baseline increased.

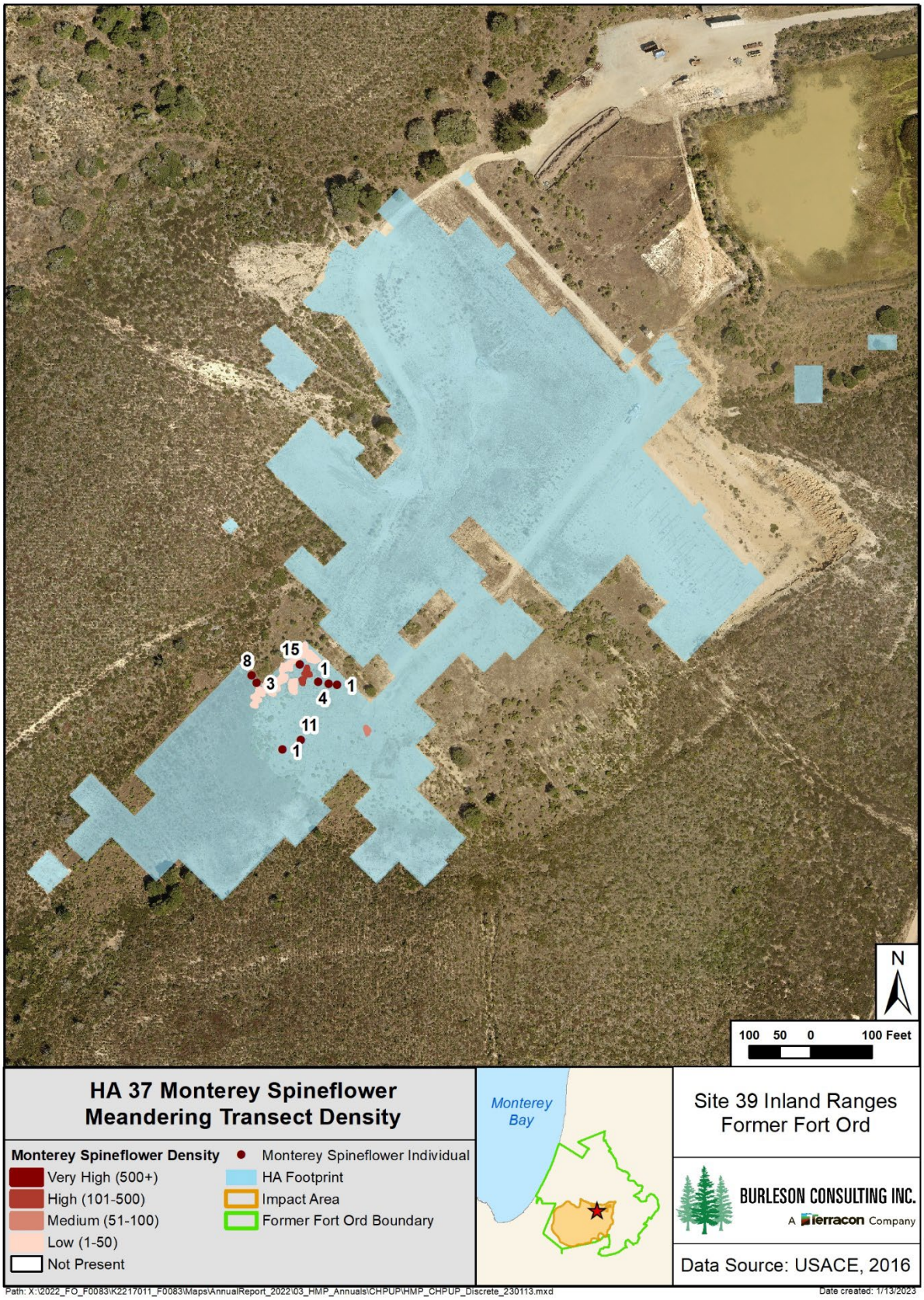


Figure 9-28. HA 37 Monterey Spineflower Meandering Transect Density Map

9.13.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 37 for plants installed in 2014, 2015, 2016, 2017, 2020, 2021, and 2022. A total of 13 shrub species and 1,452 individual plants were monitored for survivorship. By year 3 of monitoring, survivorship was 67% for the 2014 planting, 38% for the 2015 planting, 44% for the 2016 planting, 50% for the 2017 planting, and 46% for 2020 planting. By year 2 of monitoring for the 2021 planting, survivorship was 56%. By year 1 of monitoring for the 2022 planting, survivorship was 55%. Tables 9-89 through 9-95 present results by species.

Table 9-89. Plant Survivorship Monitoring Summary for 2014 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2014)	Year Two (2015)	Year Three (2016)
			Alive (%)	Alive (%)	Alive (%)
ADFA	636	61	97	93	90
ARHO*	234	23	87	70	65
ARMO*	389	39	82	62	56
ARTO	621	62	74	68	65
BAPI	234	24	100	100	83
CERI*	315	32	56	44	38
LUAR	208	16	81	31	31
SAME	362	25	100	100	84
TOTAL	**2,999**	**282**	**84**	**73**	**67**

* HMP Species

Table 9-90. Plant Survivorship Monitoring Summary for 2015 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2015)	Year Two (2016)	Year Three (2017)
			Alive (%)	Alive (%)	Alive (%)
ADFA	363	36	97	88	81
ARHO*	325	33	67	61	58
ARMO*	370	37	51	27	27
ARTO	554	54	48	35	33
BAPI	284	28	82	64	50
CERI*	652	65	40	18	20
LUCH/LUAL	165	17	71	47	24
LUAR	243	24	38	17	4
SAME	250	25	92	52	52
TOTAL	**3,206**	**319**	**61**	**42**	**38**

* HMP Species

Table 9-91. Plant Survivorship Monitoring Summary for 2016 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2016)	Year Two (2017)	Year Three (2018)
			Alive (%)	Alive (%)	Alive (%)
ADFA	316	30	93	93	90
ARHO*	270	26	73	72	72
ARMO*	141	14	64	64	43
ARPU*	220	23	70	64	58
ARTO	497	49	57	53	48
BAPI	431	41	46	41	33
CERI*	239	20	30	20	15
GAEL	17	4	25	25	25
LUCH/LUAL	146	15	67	20	0
LUAR	175	18	6	6	0
SAME	15	2	50	50	0
TOTAL	**2,467**	**242**	**57**	**51**	**44**

* HMP Species

Table 9-92. Plant Survivorship Monitoring Summary for 2017 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2017)	Year Two (2018)	Year Three (2019)
			Alive (%)	Alive (%)	Alive (%)
ADFA	140	14	36	29	29
ARCA	155	16	56	88	76
ARHO*	157	16	100	100	100
ARMO*	206	21	76	70	74
ARPU*	237	24	75	48	45
ARTO	356	36	94	77	77
BAPI	329	33	52	50	41
CERI*	140	14	36	14	14
GAEL	2	2	50	100	50
LUCH/LUAL	242	24	25	29	21
LUAR	262	26	35	12	0
SAME	258	26	73	77	77
TOTAL	**2,484**	**252**	**62**	**55**	**50**

* HMP Species

Table 9-93. Plant Survivorship Monitoring Summary for 2020 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2020)	Year Two (2021)	Year Three (2022)
			Alive (%)	Alive (%)	Alive (%)
ADFA	118	10	70	60	70
ARHO*	19	10	70	56	50
ARMO*	33	10	80	60	50
ARPU*	25	10	60	60	60
ARTO	95	10	90	80	70
BAPI	71	10	100	80	50
CERI*	32	10	60	70	50
GAEL	25	10	30	30	30
LUAR	33	10	30	0	0
LUCH/LUAL	33	9	30	20	11
SAME	40	10	60	60	60
Total	**524**	**110**	**62**	**52**	**46**

* HMP Species

Table 9-94. Plant Survivorship Monitoring Summary for 2021 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2021)	Year Two (2022)
			Alive (%)	Alive (%)
ADFA	100	10	90	80
ARHO*	71	10	50	50
ARMO*	161	16	50	50
ARPU*	129	11	42	27
ARTO	279	26	63	62
BAPI	80	9	89	78
CERI*	128	13	77	77
GAEL	80	10	60	60
LUAR	100	10	0	0
LUCH/LUAL	100	9	40	33
SAME	120	12	91	83
Total	**1348**	**139**	**59**	**56**

* HMP Species

Table 9-95. Plant Survivorship Monitoring Summary for 2022 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2022)
			Alive (%)
ADFA	40	10	90
ARHO*	11	10	40
ARMO*	19	10	80
ARPU*	15	10	50
ARTO	52	9	56
BAPI	25	10	70
CERI*	19	10	80
FRCA	10	10	60
GAEL	15	10	70
LUCH/LUAL	19	10	0
LUAR	26	10	0
SAME	23	10	70
Total	**274**	**119**	**55**

* HMP Species

9.13.2.3 Species Richness

Ninety-six species were observed at HA 37. Of those, 45 were native shrubs or perennials, 24 were native annual herbaceous species, 26 were non-native species, and one was not categorized as it was only identified to genus (see Table 9-96). Species richness decreased by 10 species since 2019. Native shrub and perennial species richness increased by one, native herbaceous species richness decreased by two, non-native species richness decreased by seven, and uncategorized species richness decreased by two. Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of species richness and comparison to the success criteria (see section 6.1.4).

Table 9-96. Species Observed on HA 37, 2022

Scientific Names	Common Names	Code	Category
Achillea millefolium	common yarrow	ACMI	NP
Acmispon americanus var. *americanus*	Spanish clover	ACAMA	NF
Acmispon glaber	deerweed	ACGL	NP
Acmispon parviflorus	hill lotus	ACPA	NF
Adenostoma fasciculatum	chamise	ADFA	NP
Agoseris grandiflora	large-flowered agoseris	AGGR	NP
Aira caryophyllea	silver hair grass	AICA	NNF
*Arctostaphylos hookeri**	Hooker's manzanita	ARHO	NP
*Arctostaphylos montereyensis**	Monterey manzanita	ARMO	NP
*Arctostaphylos pumila**	sandmat manzanita	ARPU	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Artemisia californica	California sagebrush	ARCA	NP
Avena barbata	slender wild oat	AVBA	NNF
Baccharis pilularis	coyote brush	BAPI	NP
Briza maxima	rattlesnake grass	BRMA	NNF
Bromus diandrus	ripgut brome	BRDI	NNF

Table 9-96. Species Observed on HA 37, 2022

Scientific Names	Common Names	Code	Category
Bromus hordeaceus	soft chess	BRHO	NNF
Calochortus albus	white globe lily	CAAL	NP
Carpobrotus edulis	hottentot fig	CAED	NNP
Castilleja densiflora	owl's clover	CADE	NF
Ceanothus dentatus	dwarf ceanothus	CEDE	NP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Centaurea melitensis	tocalote	CEME	NNF
Chorizanthe diffusa	diffuse spineflower	CHDI	NF
Chorizanthe pungens var. *pungens**	Monterey spineflower	CHPUP	NF
Chlorogalum pomeridianum	wavyleaf soap plant	CHPO	NP
Clarkia purpurea ssp. *quadrivulnera*	winecup clarkia	CLPUQ	NF
Crassula connata	pygmy-weed	CRCO	NF
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Danthonia californica	California oat grass	DACA	NP
Daucus pusillus	wild carrot	DAPU	NF
Deinandra corymbosa	coastal tarweed	DECO	NF
Diplacus aurantiacus	sticky monkeyflower	DIAU	NP
Drymocallis glandulosa var. *wrangelliana*	sticky cinquefoil	DRGLW	NP
Elymus glaucus	blue wild-rye	ELGL	NP
Ericameria ericoides	mock heather	ERER	NP
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium botrys	long-beaked filaree	ERBO	NNF
Erodium cicutarium	red-stemmed filaree	ERCI	NNF
Festuca myuros	rattail sixweeks grass	FEMY	NNF
Galium porrigens	climbing bedstraw	GAPO	NF
Gamochaeta ustulata	purple cudweed	GAUS	NP
Garrya elliptica	coast silk tassel	GAEL	NP
Heteromeles arbutifolia	toyon	HEAR	NP
Heterotheca grandiflora	telegraph weed	HEGR	NF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Hypochaeris glabra	smooth cat's ear	HYGL	NNF
Hypochaeris radicata	rough cat's ear	HYRA	NNP
Juncus sp.	rush	JU	0
Lepechinia calycina	pitcher sage	LECA	NP
Logfia gallica	daggerleaf cottonrose	LOGA	NNF
Lupinus chamissonis/albifrons	silver bush lupine	LUCH/LUAL	NP
Lupinus arboreus	yellow bush lupine	LUAR	NP
Lupinus bicolor	miniature lupine	LUBI	NF
Lupinus nanus	sky lupine	LUNA	NF
Luzula comosa var. *comosa*	Pacific wood rush	LUCOC	NP
Lysimachia arvensis	scarlet pimpernel	LYAR	NNF
Madia exigua	little tarweed	MAEX	NF
Madia gracilis	slender tarweed	MAGR	NF
Madia sativa	coast tarweed	MASA	NF
Madia sp.	tarweed	MA	NF
Navarretia atractyloides	Holly-leaf navarretia	NAAT	NF
Navarretia mellita	skunk navarretia	NAME	NF
Petrorhagia dubia	hairypink	PEDU	NNF

Table 9-96. Species Observed on HA 37, 2022

Scientific Names	Common Names	Code	Category
Piperia sp.	rein orchid	PI	NP
Plantago coronopus	cut-leaved plantain	PLCO	NNF
Polycarpon tetraphyllum var. *tetraphyllum*	four-leaved allseed	POTET	NNF
Polygala californica	California milkwort	POCA	NP
Pseudognaphalium luteoalbum	weedy cudweed	PSLU	NNF
Pseudognaphalium ramosissimum	pink everlasting	PSRA	NP
Pseudognaphalium stramineum	cotton-batting plant	PSST	NP
Psilocarphus tenellus	slender woolly-marbles	PSTE	NF
Quercus agrifolia	coast live oak	QUAG	NP
Rumex acetosella	sheep sorrel	RUAC	NNP
Rumex salicifolius	willow leaved dock	RUSA	NP
Salix sp.	willow	SA	NP
Salvia mellifera	black sage	SAME	NP
Sanicula laciniata	coast sanicle	SALA7	NP
Senecio glomeratus	cutleaf burnweed	SEGL	NNF
Silene gallica	small-flower catchfly	SIGA	NNF
Sisyrinchium bellum	western blue-eyed grass	SIBE	NP
Stipa pulchra	purple needle grass	STPU	NP
Symphoricarpos albus var. *laevigatus*	common snowberry	SYALL	NP
Toxicodendron diversilobum	poison oak	TODI	NP
Toxicoscordion fremontii	Fremont's deathcamas	TOFR	NP
Trifolium angustifolium	narrow-leaved clover	TRAN	NNF
Trifolium campestre	hop clover	TRCA	NNF
Trifolium dubium	little hop clover	TRDU	NNF
Trifolium gracilentum	pinpoint clover	TRGR	NF
Trifolium hirtum	rose clover	TRHI	NNF
Trifolium microcephalum	small-head clover	TRMI	NF
Trifolium willdenovii	tomcat clover	TRWI	NF
Triteleia sp.	Triteleia	TRI	NP
Triteleia ixioides	pretty face	TRIX	NP
Vicia sativa ssp. *nigra*	narrow-leaved vetch	VISAN	NNF
Zeltnera davyi	Davy's centaury	ZEDA	NF
Achillea millefolium	common yarrow	ACMI	NP

* HMP species

9.13.2.4 Vegetative Cover

Burleson surveyed 12 50-meter line-intercept transects at HA 37 in 2022. These surveys indicated that the mean vegetative cover by native shrubs and perennials was 40.46%. The mean vegetative cover by native shrubs and perennials was greater in 2022 than 2019 by 9.39%. Table 9-97 summarizes vegetative cover, Table 9-98 presents vegetative cover by species. Figure 9-29 presents the percent cover of dominant species at HA 37 from 2016, 2017, 2018, 2019, and 2022.

Table 9-97. Transect Survey Summary for HA 37

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perrenial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA37T01	15.36	12.34	2.80	59.90	33.14
HA37T02	37.68	34.06	1.84	61.46	35.08
HA37T03	37.12	29.62	6.80	91.56	8.38
HA37T04	112.86	112.86	0.00	96.64	2.12
HA37T05	27.28	19.62	7.66	91.96	8.04
HA37T06	107.94	107.74	0.00	76.00	14.32
HA37T07	18.54	16.92	1.16	76.40	22.88
HA37T08	55.84	55.64	0.00	53.84	36.58
HA37T09	18.92	16.78	2.14	84.58	14.92
HA37T10	16.30	10.12	6.18	91.18	7.50
HA37T11	23.50	22.66	0.00	57.32	39.68
HA37T12*	47.10	47.10	0.00	99.40	0.56
Site Average	**43.20**	**40.46**	**2.38**	**78.35**	**18.60**

*Transect HA37T12 was added in 2022.

Table 9-98. Transect Survey Results for HA 37 by Species

Transect	ACAMA (%)	ACGL (%)	ACMI (%)	ADFA (%)	AICA (%)	ARCA (%)	ARHO* (%)	ARMO* (%)	ARPU* (%)	ARTO (%)	BAPI (%)	CEDE (%)	CERI* (%)
HA37T01	0.22	1.94	0.00	4.04	0.00	0.28	3.96	0.26	0.20	0.00	0.00	0.00	0.00
HA37T02	1.58	7.16	0.00	5.54	0.00	0.36	0.00	2.96	3.34	0.00	5.06	0.00	3.94
HA37T03	0.24	10.36	0.00	1.04	2.38	0.30	0.00	0.00	0.00	0.86	5.84	0.00	0.00
HA37T04	0.00	16.32	0.00	2.60	0.00	13.52	1.80	10.32	0.00	5.54	2.60	1.36	9.84
HA37T05	0.00	4.88	0.00	0.00	0.00	5.66	0.00	0.00	0.00	0.00	0.00	0.00	5.10
HA37T06	0.00	11.70	0.00	3.62	0.00	4.28	3.72	4.66	1.24	12.74	4.66	0.00	4.68
HA37T07	0.46	6.78	0.00	0.00	0.00	0.00	5.08	1.52	0.00	1.54	0.00	0.70	0.00
HA37T08	0.20	20.26	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.34	0.00	0.00
HA37T09	0.00	9.38	0.00	0.00	0.00	0.24	0.00	0.00	0.50	0.00	0.00	0.00	0.00
HA37T10	0.00	6.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HA37T11	0.00	4.18	0.00	0.00	0.00	0.00	0.32	0.00	0.00	0.00	3.16	3.28	2.36
HA37T12	0.00	1.42	0.00	0.00	0.00	0.00	0.00	6.42	4.86	17.00	4.38	0.44	1.50
SITE AVERAGE	**0.23**	**8.41**	**0.04**	**1.40**	**0.20**	**2.05**	**1.24**	**2.18**	**0.85**	**3.14**	**5.00**	**0.48**	**2.29**

* HMP species

Table 9-98 (continued). Transect Survey Results for HA 37 by Species

Transect	CRSC (%)	DACA (%)	DECO (%)	DIAU (%)	ELGL (%)	ERCO (%)	ERER (%)	FEBR (%)	FEMY (%)	HOCU (%)	HYRA (%)	LUAR (%)	MAEX (%)
HA37T01	0.56	0.00	0.00	0.00	0.00	0.00	0.00	2.44	0.00	0.60	0.00	0.50	0.00
HA37T02	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.20	4.90	0.00	0.00	0.00
HA37T03	0.00	0.00	0.46	0.00	0.24	0.00	0.00	0.00	0.36	10.98	0.00	0.00	0.00
HA37T04	0.86	0.00	0.00	0.56	0.00	0.00	0.00	0.00	0.00	34.98	0.00	0.00	0.00
HA37T05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	3.98	1.00	0.00	0.00
HA37T06	0.56	0.00	0.00	2.98	0.56	0.88	0.38	0.00	0.00	39.32	0.00	0.00	0.20
HA37T07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.94	1.10	0.00
HA37T08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00
HA37T09	0.00	0.00	0.00	0.00	0.22	0.00	0.00	0.00	0.00	5.86	0.22	0.00	0.00
HA37T10	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.24	0.42	0.00	0.00
HA37T11	0.00	0.26	0.00	0.26	0.00	0.00	0.00	0.00	0.00	6.00	0.00	0.00	0.84
HA37T12	0.00	0.00	0.00	2.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SITE AVERAGE	**0.19**	**0.02**	**0.06**	**0.56**	**0.08**	**0.07**	**0.03**	**0.20**	**0.15**	**9.21**	**0.22**	**0.13**	**0.09**

Table 9-98 (continued). Transect Survey Results for HA 37 by Species

Transect	PLCO (%)	QUAG (%)	RUAC (%)	RUUR (%)	SAME (%)	SIBE (%)	SIGA (%)	STPU (%)	TODI (%)	TRAN (%)	TRHI (%)	TH (%)	BG (%)
HA37T01	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	59.90	33.14
HA37T02	1.38	0.00	0.26	0.00	0.00	0.80	0.00	0.00	0.00	0.00	0.00	61.46	35.08
HA37T03	4.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.56	8.38
HA37T04	0.00	0.00	0.00	0.00	5.86	0.00	0.00	0.00	6.70	0.00	0.00	96.64	2.12
HA37T05	3.34	0.00	2.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	91.96	8.04
HA37T06	0.00	0.00	0.00	1.92	6.94	0.00	0.00	0.00	2.90	0.00	0.00	76.00	14.32
HA37T07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.00	76.40	22.88
HA37T08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.84	36.58
HA37T09	0.90	0.00	0.46	0.00	0.58	0.00	0.20	0.00	0.00	0.00	0.36	84.58	14.92
HA37T10	5.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	91.18	7.50
HA37T11	0.00	0.48	0.00	0.00	0.00	0.00	0.00	0.00	2.36	0.00	0.00	57.32	39.68
HA37T12	0.00	0.00	0.00	0.00	6.68	0.00	0.00	1.48	0.00	0.00	0.00	99.40	0.56
SITE AVERAGE	**1.30**	**0.04**	**0.23**	**0.16**	**1.67**	**0.07**	**0.02**	**0.12**	**1.00**	**0.04**	**0.03**	**78.35**	**18.60**

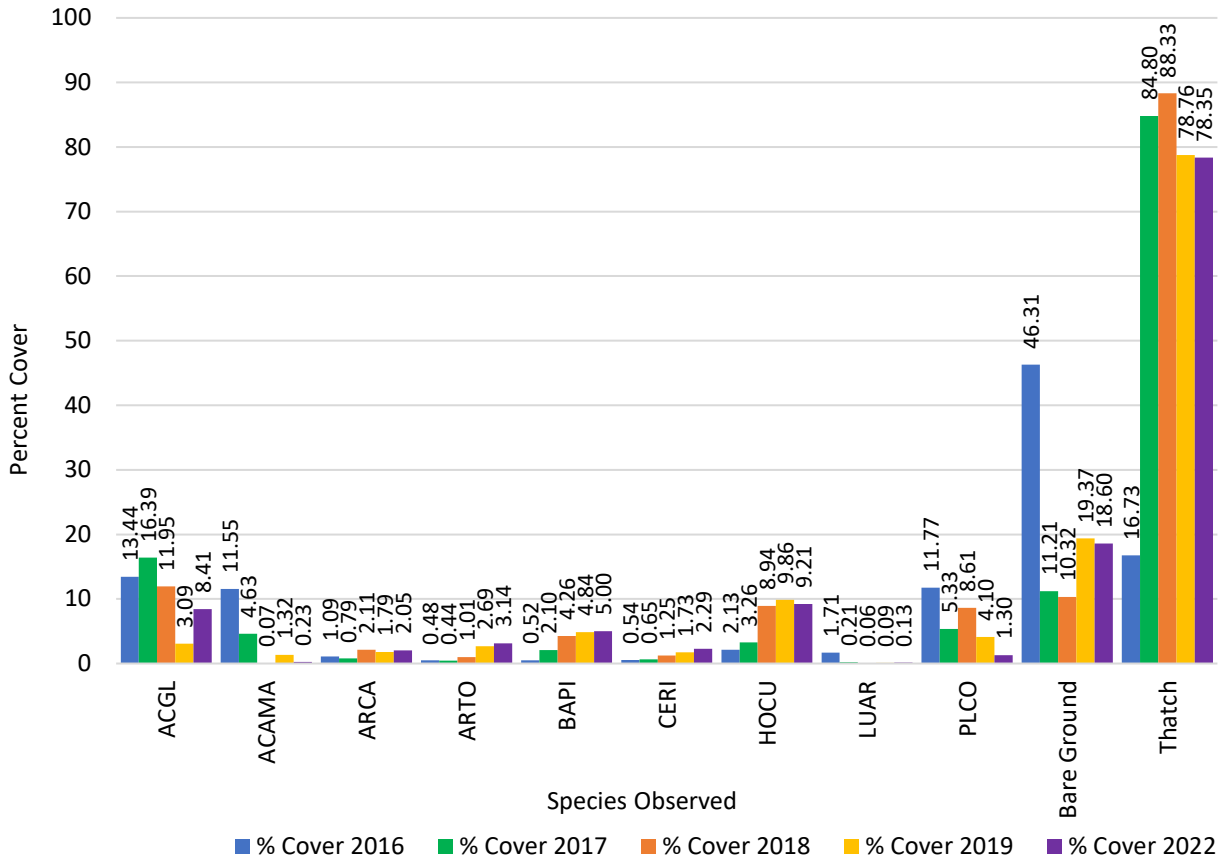


Figure 9-29. Percent Cover of Dominant Species at HA 37 in 2016, 2017, 2018, 2019, and 2022.

9.13.3 Monitoring Results Discussion

9.13.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 37. The SSRP baseline density class for Monterey spineflower was low. Year 7 and Year 8 Monterey spineflower restoration plot results show that the density met the success criterion under Objective 3 for all four plots. In addition, Monterey spineflower was present outside the restoration plots. Discrete patches, with density that met or exceeded the success criterion, covered 0.039 acres of HA 37.

9.13.3.2 Plant Survivorship

Plant survivorship was moderate for the 2014, 2017, 2021, and 2022 planting events and low for the 2015, 2016, and 2020 planting events at HA 37. For plant survivorship classifications of each species by planting year, see Table 9-99. Low survivorship for Monterey ceanothus, coast silk tassel (*Garrya elliptica*), silver bush lupine (*Lupinus chamissonis/albifrons*), and yellow bush lupine has been seen at other sites where plant survivorship monitoring occurred. The 2021 planting will be monitored for one more year and the 2022 planting will be monitored for two more years.

Table 9-99. Plant Survivorship Classifications for All Planting Years at HA 37

Species	Planting Year						
	2014	2015	2016	2017	2020	2021	2022
ADFA	high	high	high	low	moderate	high	high
ARCA	-	-	-	moderate	-	-	-
ARHO*	moderate	moderate	moderate	high	moderate	moderate	low
ARMO*	moderate	low	low	moderate	moderate	moderate	high
ARPU*	-	-	moderate	low	moderate	low	moderate
ARTO	moderate	low	low	moderate	moderate	moderate	moderate
BAPI	high	moderate	low	low	moderate	moderate	moderate
CERI*	low	low	low	low	moderate	moderate	high
FRCA	-	-	-	-	-	-	moderate
GAEL	-	-	low	low	low	moderate	moderate
LUCH	-	-	-	-	low	-	-
LUCH/LUAL	-	-	low	low	-	low	low
LUAR	low	low	low	low	low	low	low
SAME	high	moderate	low	moderate	moderate	high	moderate

* HMP species

9.13.3.3 Species Richness

Chamise, Hooker's manzanita, Monterey manzanita, sandmat manzanita, shaggy-bark manzanita, coyote brush, Monterey ceanothus, Silk tassel (*Garrya elliptica*) and black sage were present. HA 37 included 45 native shrub and perennial species and met the success criterion for Objective 1.

9.13.3.4 Vegetative Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For Objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 22 shrub and perennial species presented in Table 2 of the HA 37 SSRP (Burleson, 2013). These species contributed 36.60% cover to the HA, an increase of 9.59% since 2019. This success criterion was not met (see Figure 9-30).

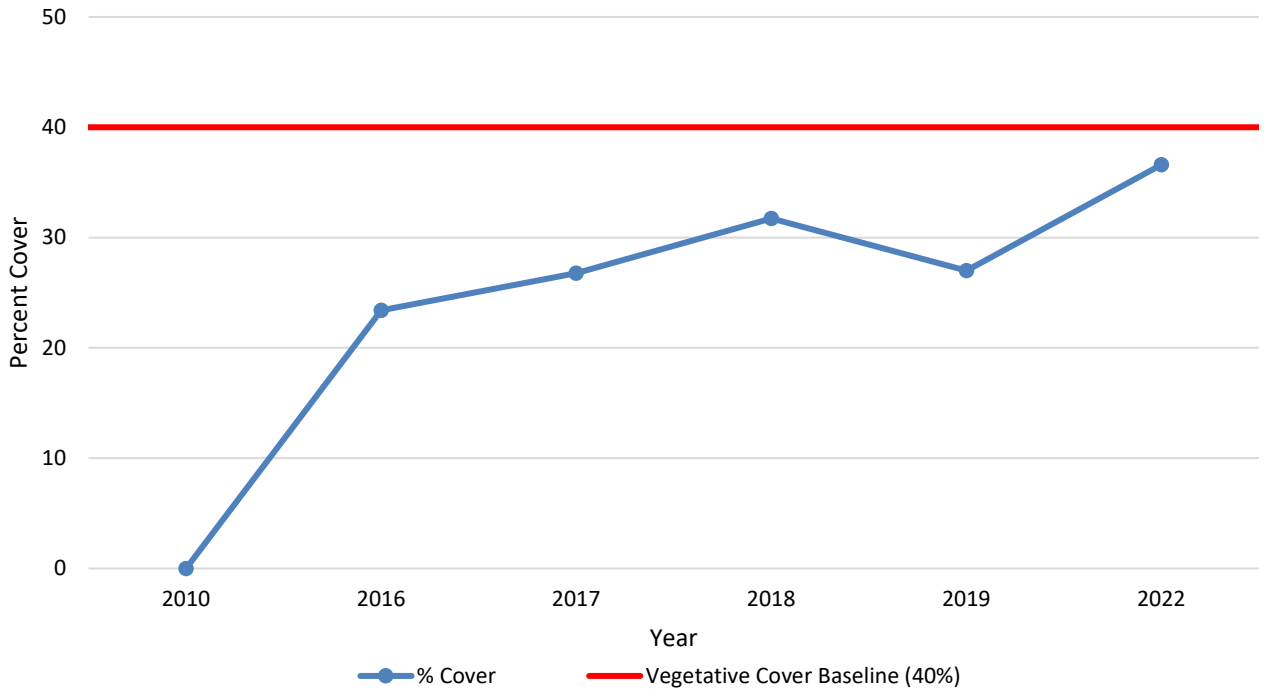


Figure 9-30. Native Vegetative Cover Compared to the Success Criterion at HA 37

Objective 2 considers the percent cover of non-native target weeds. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 3. Cover class 3 ranges from 6-25% of absolute cover. The HMP shrub species at HA 37 provided an absolute cover of 6.55%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 37, this means a vegetative cover average of at least 2% for sandmat manzanita, 4% for Monterey manzanita, 2% for Monterey ceanothus, and 1% for Hooker's manzanita. The average vegetative cover for sandmat manzanita was 0.85%, Monterey manzanita was 2.18%, Monterey ceanothus was 2.29%, and Hooker's manzanita was 1.24% (see Figure 9-31). All four species increased in cover from 2019 to 2022. Monterey ceanothus and Hooker's manzanita cover were within the acceptable limit; however, sandmat manzanita and Monterey manzanita cover were not. The success criterion was not met.

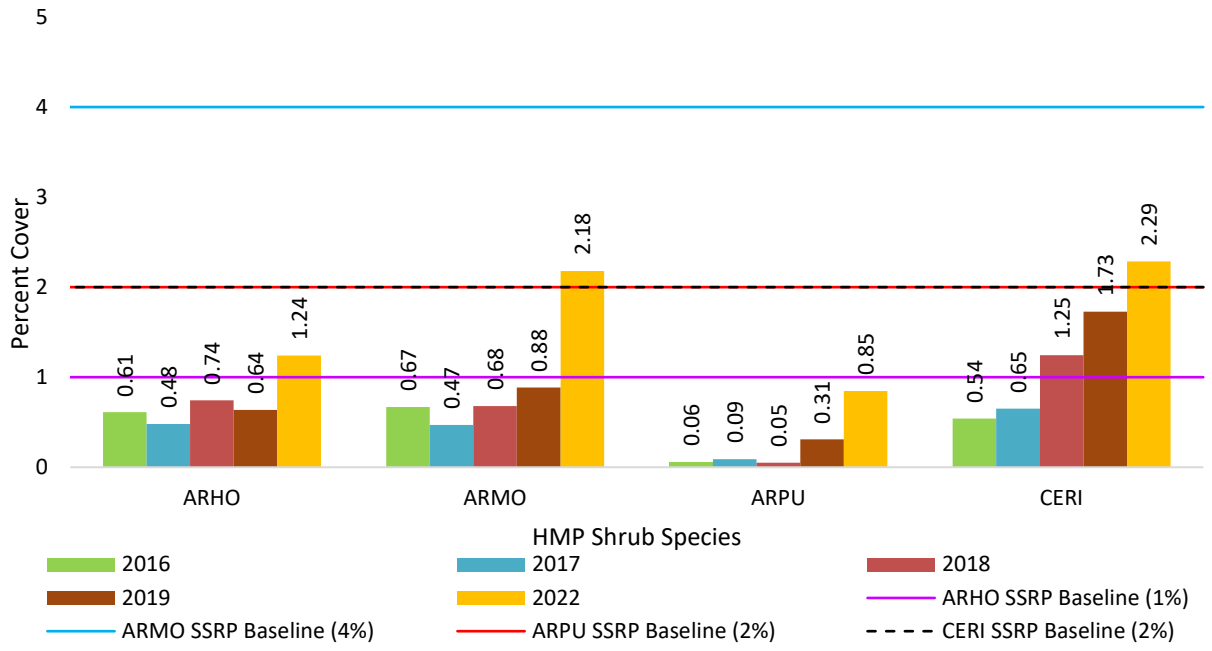


Figure 9-31. HMP Shrub Species Comparison to Success Criteria at HA 37

9.13.4 HA Status Discussion

HA 37 was in year 8 of monitoring in 2022; species richness, plant survivorship, vegetative cover, and HMP annual density monitoring were conducted. The site met three of six success criteria in 2022. HA 37 has a moderate chance of meeting the HMP shrub cover by species criterion for sandmat manzanita, and a high chance of meeting the criterion for Monterey manzanita, Monterey ceanothus, and Hooker's manzanita (see Table 9-100).

Per recommendations in the 2017 Annual Report, Monterey spineflower seed was broadcast to fulfill the SSRP target in 2020 and 2021 (Burleson, 2018). Per recommendations in the 2021 Annual Report, an additional monitoring transect (HA37T12) was installed in 2022 to better assess the site's restoration progress (see Figure 9-25; Burleson, 2022). The Army has no further recommendations at this time. SSRP planting of HMP shrubs occurred in February of 2022 and the site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-14 and Appendix F, page F-3).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in year 13, 2027 (see Table 9-85). Table 9-100 summarizes the status of HA 37 including which success criteria were met and projections for meeting criteria at year 13 of monitoring.

Table 9-100. Status for Achieving Success Criteria at HA 37

Success Criterion	Category	Acceptable Limits	Year 5 (2019) Met	Year 8 (2022) Met	Likelihood of Achieving Success by Year 13 (2027)	Notes
Objective 1 – No. 1	Species richness	9 Required species: ADFA, ARHO, ARMO, ARPU, ARTO, BAPI, CERI, GAEL, SAME	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	HIGH	**Year 5**: 27.01% **Year 8**: 36.60%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5:** 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	No	Yes	HIGH	**Year 5**: 3.56% **Year 8**: 6.55%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 2% ARMO ≥ 4% CERI ≥ 2% ARHO ≥ 1%	No	No	MODERATE for ARPU HIGH for ARMO HIGH for CERI HIGH for ARHO	**Year 5**: ARPU 0.31% ARMO 0.88% CERI 1.73% ARHO 0.64% **Year 8**: ARPU 0.85% ARMO 2.18% CERI 2.29% ARHO 1.24% (ARPU, ARMO, CERI, and ARHO planted in 2021/2022)
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Yes	NA	(Year 13 monitoring not required)

9.14 HA 38

HA 38 was used by the Army as a firing range. Soil was excavated over 1.01 acres. HA 38 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 38 is moderately sloped and surrounded by low to very high-quality habitat.

HA 38 is located on the northeastern portion of Site 39, occurring within the Aromas formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 38 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and installing native container-grown plants. HA 38 is moderately sloped and has little potential for erosion.

Restoration at HA 38 occurred between 2013 and 2017 and quantitative monitoring began in 2014. Additional seed was broadcast in 2020 and 2021 and additional plants were installed in 2021. HA 38 was monitored for 10 years by photo documentation and site visits, eight years for HMP annual density in plots, seven years for HMP annual density across the HA, four years for plant survivorship, and five years for species richness and vegetative cover (see Table 9-101). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-32 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 38 are summarized in Table 9-102.

Table 9-101. Historic Summary of Restoration and Monitoring Activities at HA 38

Activity	Monitoring Years										
			1	2	3	4	5	6	7	8	13
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2027
Restoration: Active and Passive	●	●	●		●			●	●		
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●	●	●	
Sand Gilia Plots						●	●	●	●	●	
Seaside Bird's Beak Plot									●	●	
HMP Annual Density across HA				●	●	●	●	●	●	●	
Species Richness				●	●	●	●			●	●
Vegetative Cover				●	●	●	●			●	●
Plant Survivorship		●	●	●	●						

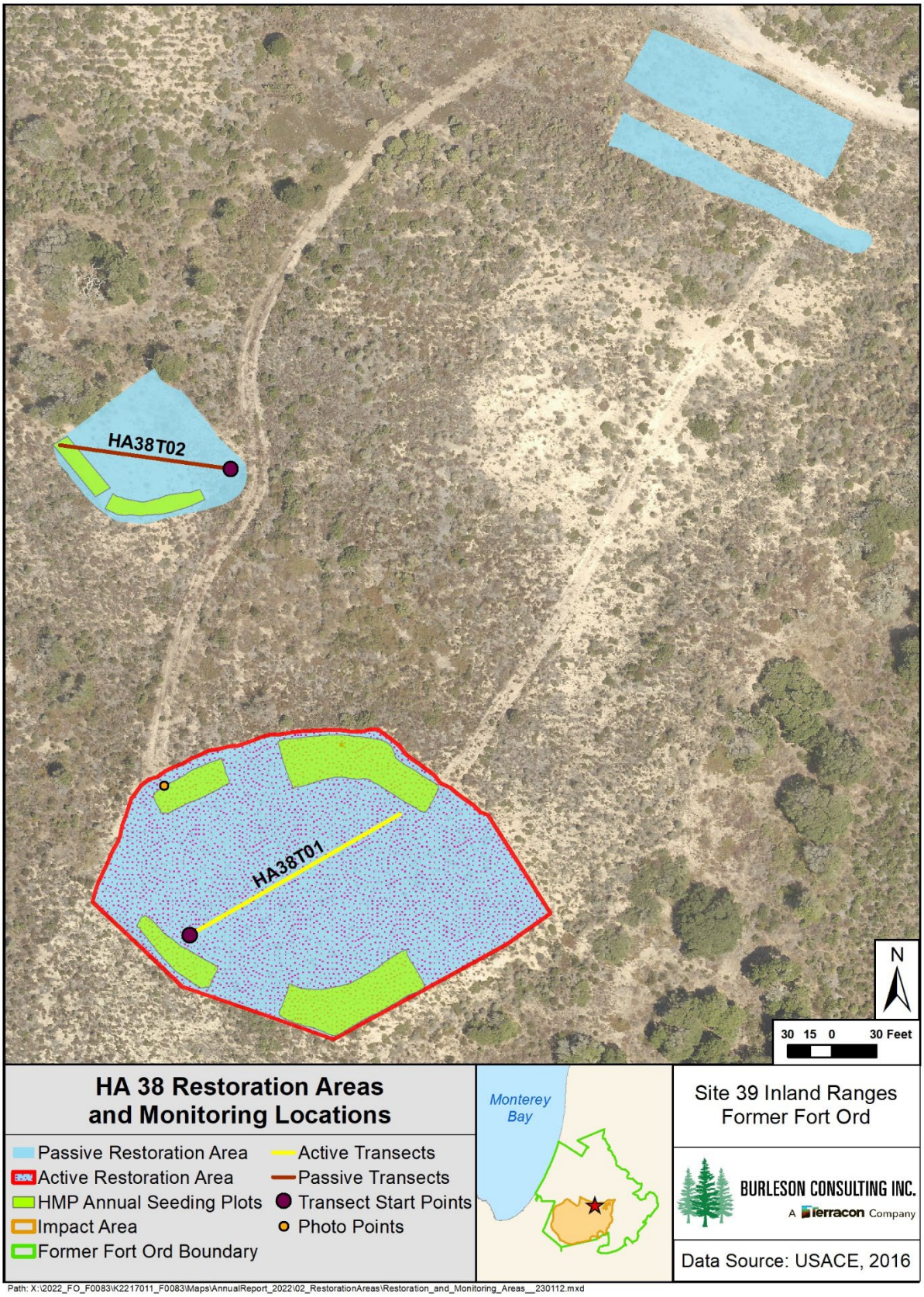


Figure 9-32. HA 38 Restoration Areas and Monitoring Locations Map

Table 9-102. Success Criteria and Acceptable Limits for Restoration of HA 38

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			shaggy-bark manzanita chamise coyote brush deerweed black sage Monterey manzanita† Monterey ceanothus† sandmat manzanita† Hooker's manzanita†
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 20 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicates presence of non-native target weed species *Carpobrotus edulis* (ice plant). No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 2 (1-5% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Monterey manzanita percent cover, as an average of transect data, must be equal or greater than 1.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 1.
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1.
			Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 4.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low Sand gilia density class: Low Seaside bird's beak density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

9.14.1 Restoration Activities

Burleson performed passive restoration at HA 38 in 2013, 2014, 2015, 2017, 2020, and 2021. The total amount of seed broadcast on site was 31.661 lb compared to 28.980 lb prescribed in the SSRP. Table 9-103 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower, sand gilia, and seaside bird's beak in 2015, 2017, 2020, and 2021. Five plots of Monterey spineflower, five plots of sand gilia, and one plot of seaside bird's beak were chosen in the HA based on having suitable habitat and adjacent extant populations (see Figure 9-32).

Table 9-103. Summary of Passive Restoration Activities for HA 38

Species	Pounds of Seed Broadcast							
	SSRP Target	2013	2014	2015	2017	2020	2021	Total by Species
ACMI	1.010	0.200	0.710	-	-	-	-	0.910
ACGL	2.020	0.400	1.410	-	-	-	-	1.810
BAPI	0.150	0.030	0.080	-	-	-	-	0.110
CERI*	1.010	-	0.510	-	-	-	-	0.510
CHPUP*	0.150	-	-	0.010	0.015	-	-	0.025
CORIL*	0.150	-	-	-	-	0.150	-	0.150
CRSC	0.760	0.152	0.580	-	-	-	-	0.732
DIAU	0.150	0.180	0.280	-	-	-	-	0.460
ELGL	4.040	0.600	6.600	-	-	-	-	7.200
ERCO	1.260	0.252	0.930	-	-	-	-	1.182
ERFA*	0.200	-	0.100	-	-	-	-	0.100
GAEL	1.010	-	-	-	-	-	-	-
GITEA*	0.150	-	-	-	0.008	0.058	0.028	0.094
HOCU	2.020	0.404	1.410	-	-	-	-	1.814
HO	10.100	2.020	12.000	-	-	-	-	14.020
LUAL	0.760	0.150	-	-	-	-	-	0.150
LUAR	-	-	0.580	-	-	-	-	0.580
SAME	2.020	0.404	1.410	-	-	-	-	1.814
STPU	2.020	-	-	-	-	-	-	-
TOTAL	**28.980**	**4.792**	**26.600**	**0.010**	**0.023**	**0.208**	**0.028**	**31.661**

* HMP species

Active restoration was completed in 2014, 2015, and 2021 at HA 38. The total number of plants installed at HA 38 was 1,916 compared to 1,842 prescribed in the SSRP. Table 9-104 summarizes the plants installed during active restoration.

Table 9-104. Summary of Active Restoration Activities for HA 38

Species	Number of Individual Plants				
	SSRP Target	2014	2015	2021	Total by Species
ACGL	82	82	-	-	82
ACMI	82	82	-	-	82
ADFA	163	163	-	-	163
ARHO*	123	123	-	-	123
ARMO*	123	123	-	-	123
ARPU*	327	-	327	-	327
ARTO	204	204	-	-	204
BAPI	82	82	-	-	82
CERI*	82	82	-	74	156
CRSC	82	82	-	-	82
DIAU	82	82	-	-	82
ERCO	82	82	-	-	82
GAEL	82	-	82	-	82
HOCU	82	82	-	-	82
LUAL	82	-	82	-	82
SAME	82	82	-	-	82
TOTAL	**1,842**	**1,351**	**491**	**74**	**1,916**

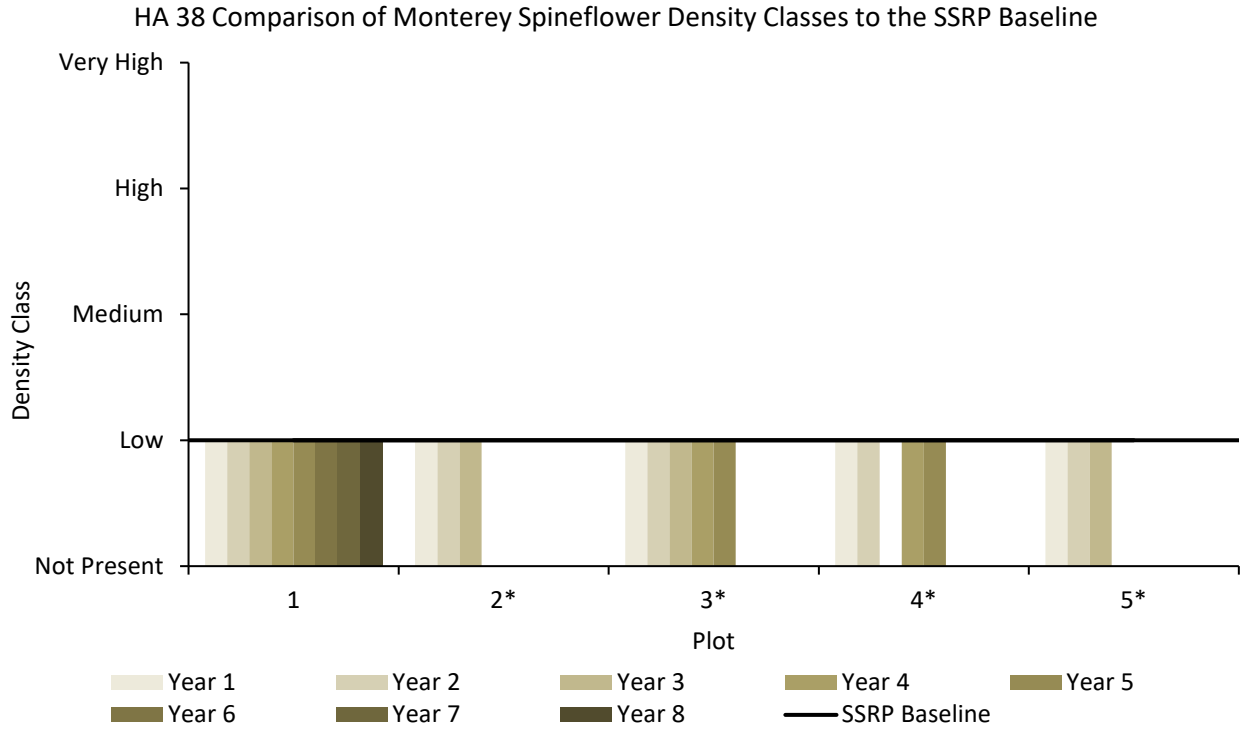
* HMP species

9.14.2 Monitoring Results

9.14.2.1 HMP Annual Density

Monterey spineflower, sand gilia, and seaside bird's beak restoration plots were monitored for density at HA 38.

Five Monterey spineflower restoration plots were monitored for year 5 (Plots 2-5) and year 8 (Plot 1) density at HA 38 in 2022. The plots are numbered 1-5 on Figure 9-34 and are located throughout HA 38. Monterey spineflower density was low at Plots 1, 3, and 4. Monterey spineflower was not present at Plots 2 and 5. Figure 9-33 presents Monterey spineflower restoration plot densities for HA 38.



* Plots 2-5 were established in 2017 and have only been monitored for years 1-5.

Figure 9-33. HA 38 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-5

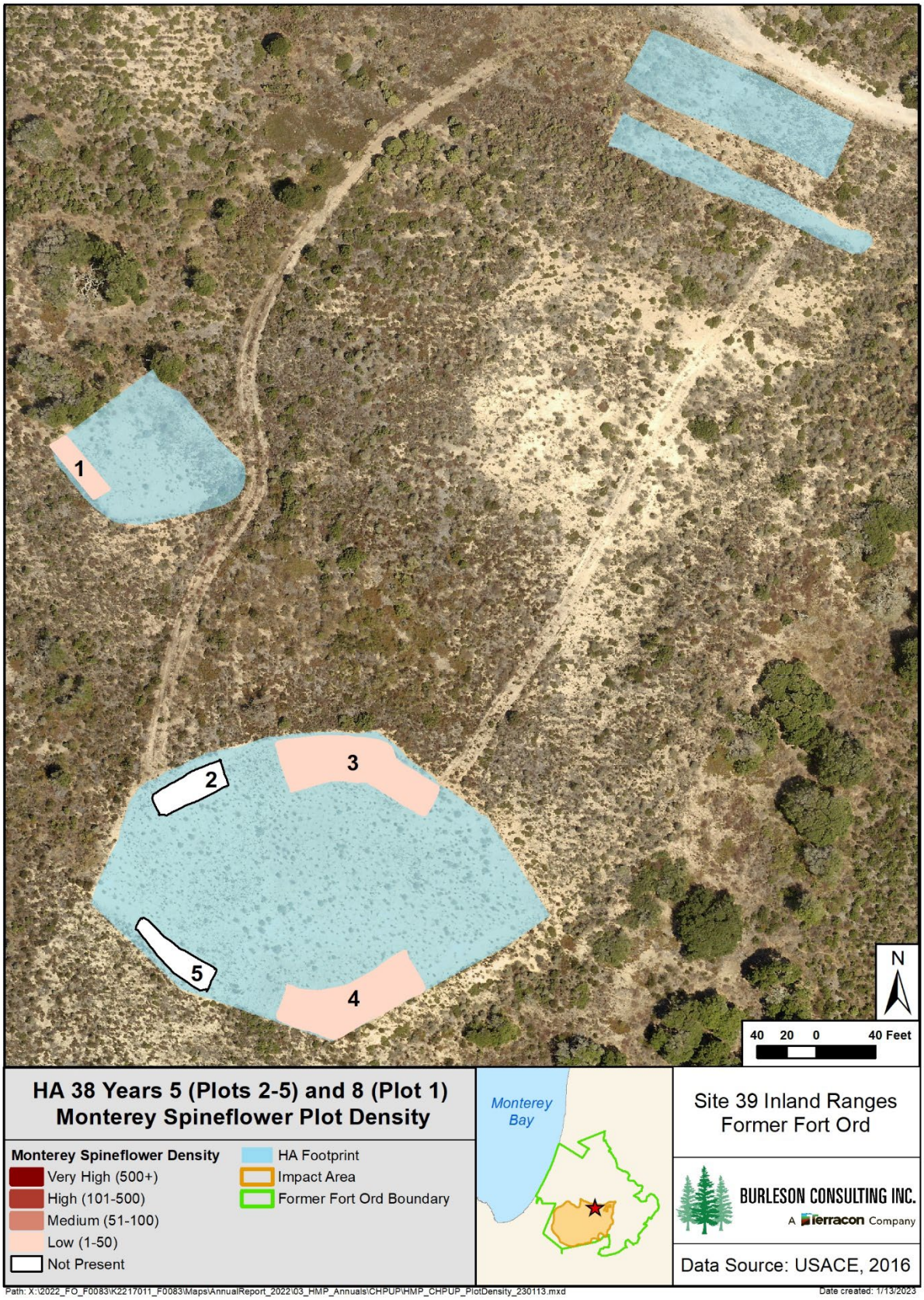
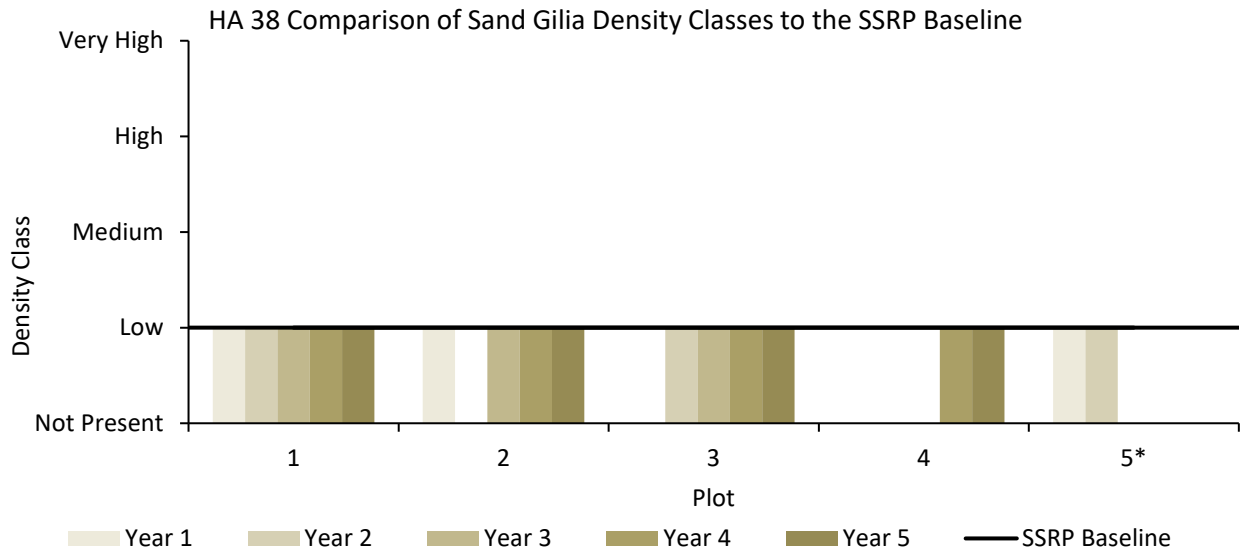


Figure 9-34. HA 38 Year 5 (Plots 2-5) and Year 8 (Plot 1) Monterey Spineflower Plot Density Map

Five sand gilia restoration plots were monitored for year 2 (Plot 5) and year 5 (Plots 1-4) density at HA 38 in 2022. The plots are numbered 1-5 on Figure 9-36 and are located throughout HA 38. Sand gilia density was low at Plots 1-5. Figure 9-35 presents sand gilia restoration plot densities for HA 38.



* Plot 5 was established in 2020 and has only been monitored for year 1 and year 2.

Figure 9-35. HA 38 Comparison of Sand Gilia Density Classes to the SSRP Baseline for Plots 1-5

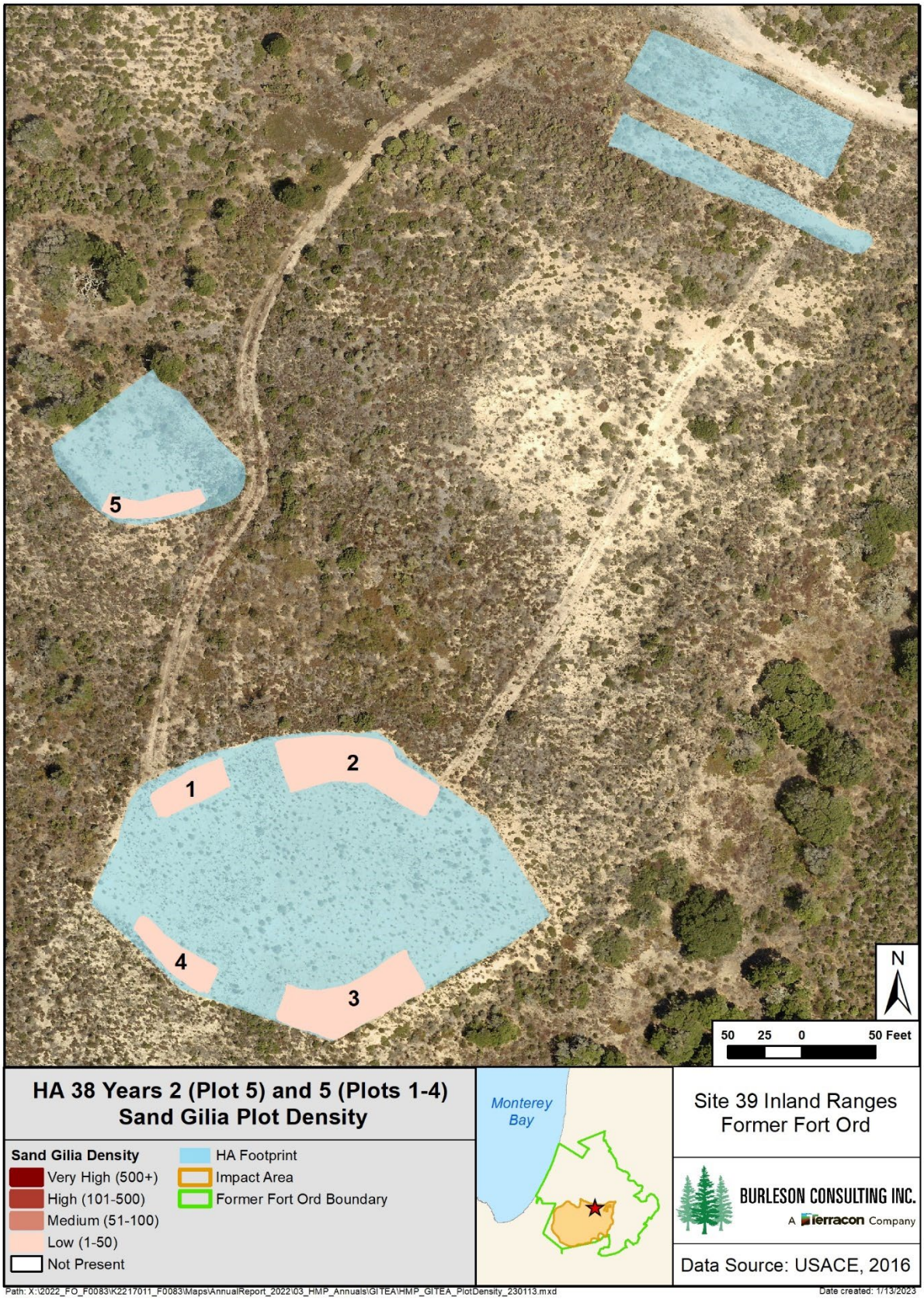


Figure 9-36. HA 38 Year 2 (Plot 5) and Year 5 (Plots 1-4) Sand Gilia Plot Density Map

One seaside bird's beak restoration plot was monitored for year 2 density at HA 38 in 2022. The plot is numbered 1 on Figure 9-38 and is located in the southern part of the site. Seaside bird's beak density was low at Plot 1. Figure 9-37 presents seaside bird's beak restoration plot densities for HA 38.

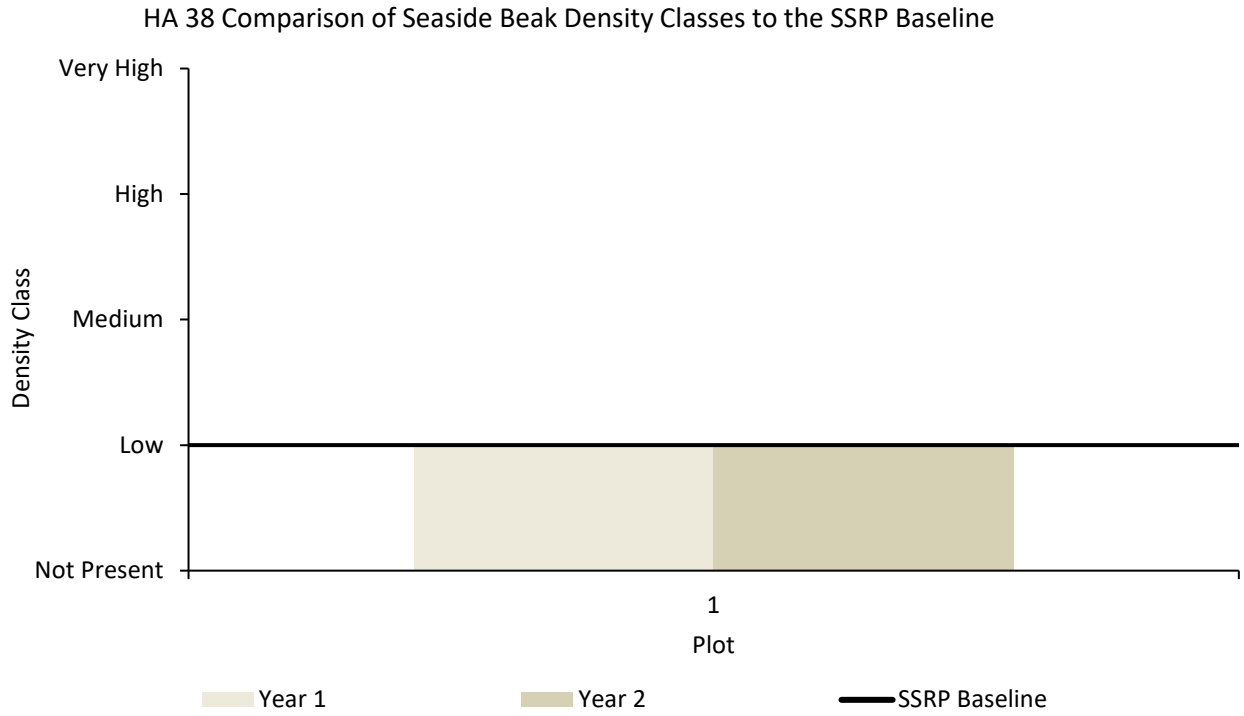


Figure 9-37. HA 38 Comparison of Seaside Bird's Beak Density Classes to the SSRP Baseline for Plot 1

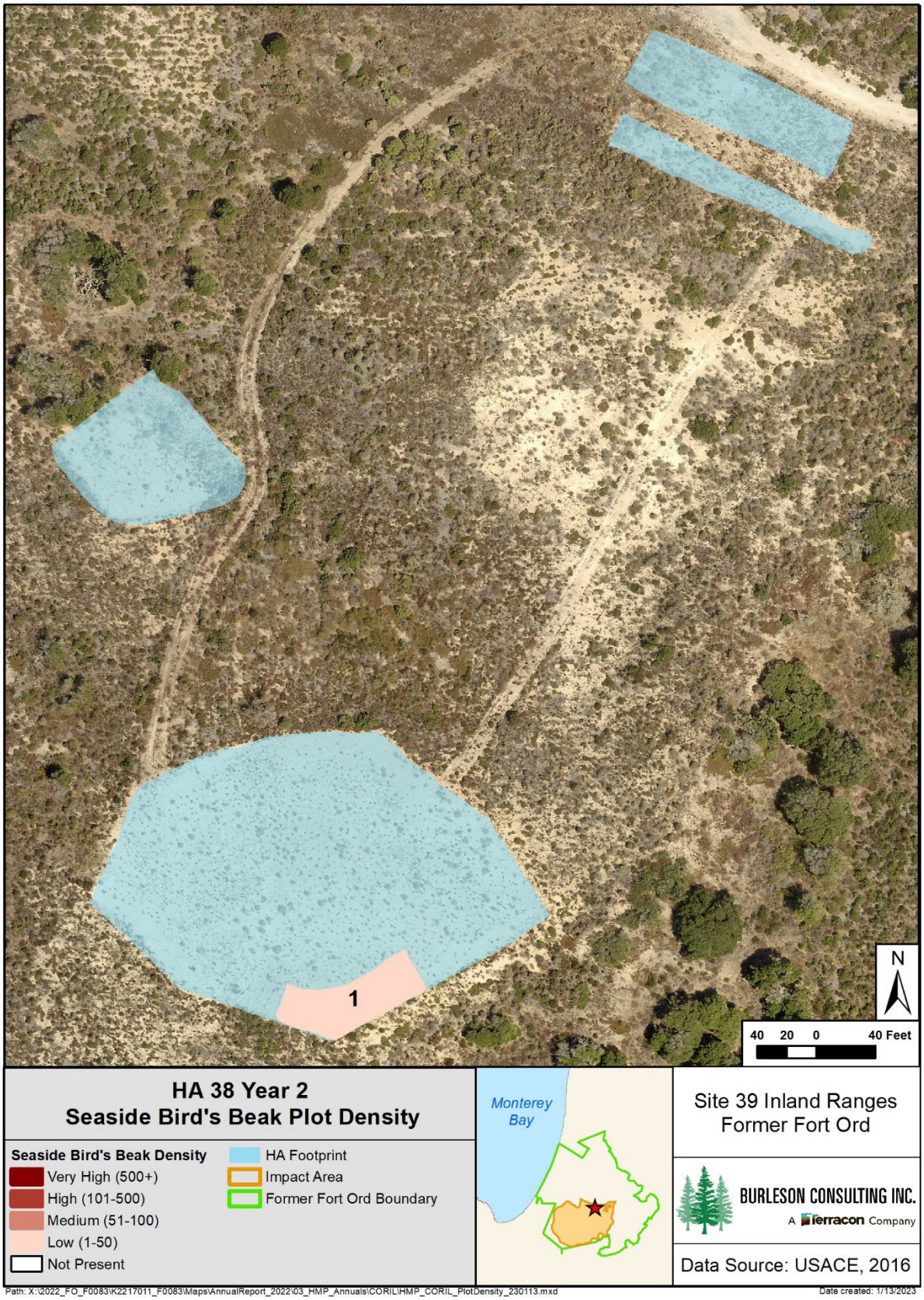


Figure 9-38. HA 38 Year 2 Seaside Bird's Beak Density Map

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. This survey was completed for Monterey spineflower, sand gilia, and seaside bird's beak at HA 38.

Sixty individual plants and 11 discrete patches of Monterey spineflower were mapped and individual plants were counted within each patch (see Figure 9-39). The densities ranged from low to high and the total acreage of Monterey spineflower patches with a density at or above the SSRP baseline density class of low was 0.026 acres. From 2021 to 2022, the density range and acreage above the SSRP baseline decreased.

One individual plant and one discrete patch of sand gilia were mapped and individual plants were counted within the patch (see Figure 9-40). The density of the patch was low and the total acreage of sand gilia patches with a density at or above the SSRP baseline density class of low was 0.001 acres. From 2021 to 2022, the density range decreased and the acreage above the SSRP baseline was the same.

Seaside bird's beak was not observed outside of the restoration plot at HA 38 in 2022 which is consistent with previous monitoring years.

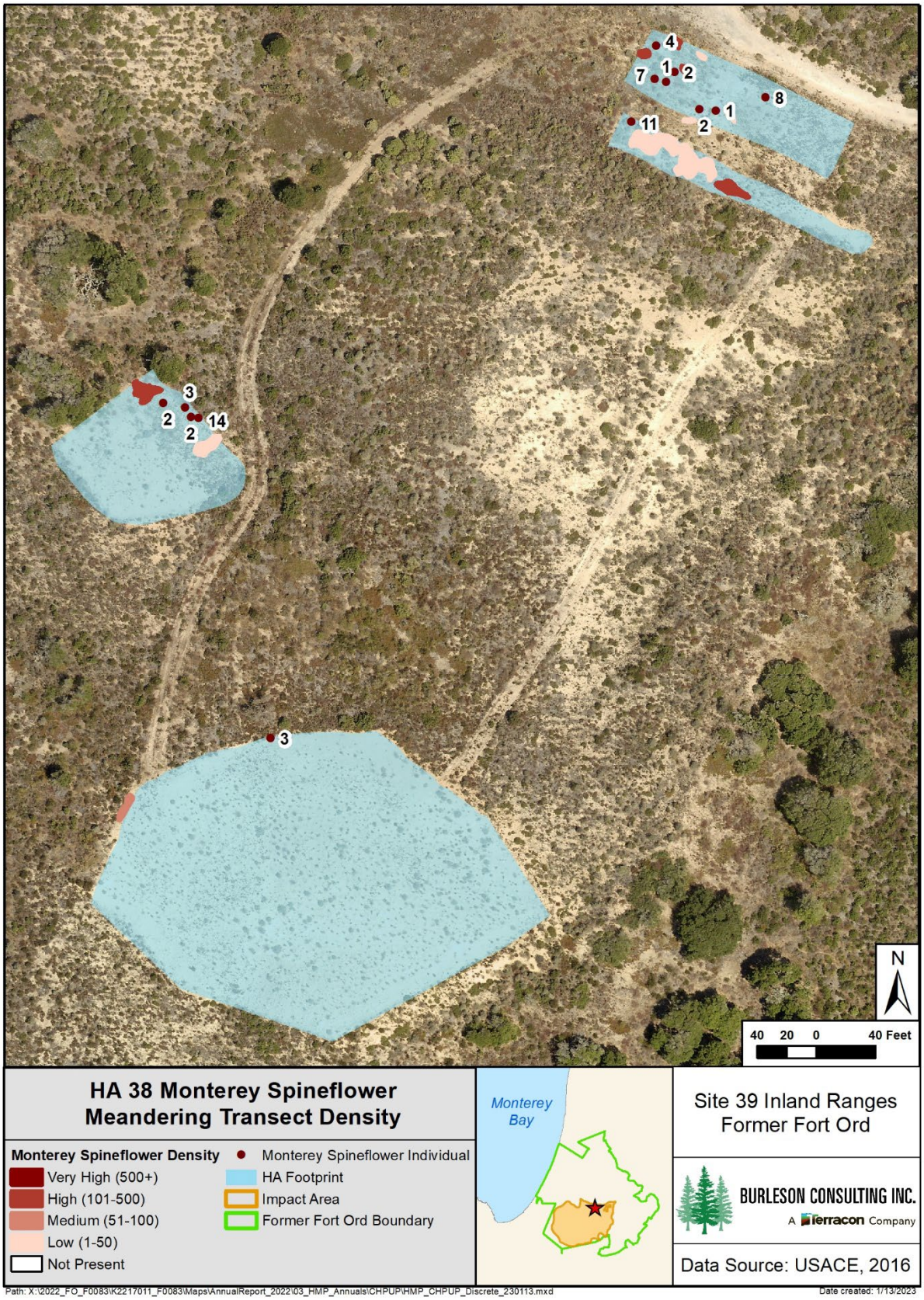


Figure 9-39. HA 38 Monterey Spineflower Meandering Transect Density Map

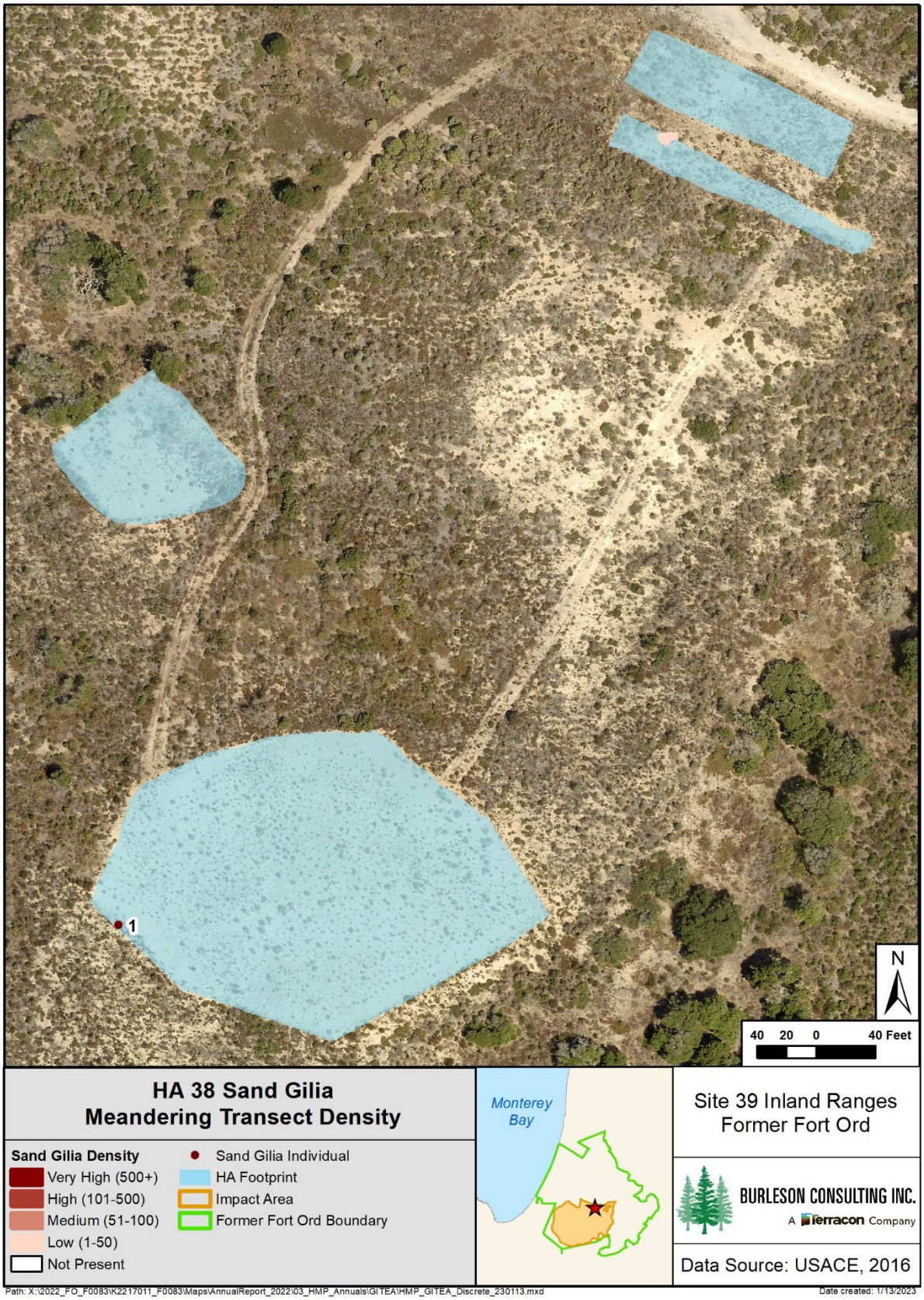


Figure 9-40. HA 38 Sand Gilia Meandering Transect Density Map

9.14.2.2 Species Richness

Sixty-five species were observed at HA 38. Of those, 31 were native shrubs or perennials, 18 were native annual herbaceous species, and 16 were non-native species (see Table 9-105). Species richness increased by nine species since 2019. Native shrub and perennial species richness stayed the same, native herbaceous species richness increased by seven, and non-native species richness increased by two. Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of species richness and comparison to the success criteria (see section 6.1.4).

Table 9-105. Species Observed on HA 38, 2022

Scientific Names	Common Names	Code	Category
Achillea millefolium	common yarrow	ACMI	NP
Acmispon glaber	deerweed	ACGL	NP
Acmispon strigosus	Bishop's lotus	ACST	NF
Adenostoma fasciculatum	chamise	ADFA	NP
Agoseris grandiflora	large-flowered agoseris	AGGR	NP
Aira caryophyllea	silver hair grass	AICA	NNF
*Arctostaphylos hookeri**	Hooker's manzanita	ARHO	NP
*Arctostaphylos montereyensis**	Monterey manzanita	ARMO	NP
*Arctostaphylos pumila**	sandmat manzanita	ARPU	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Avena barbata	slender wild oat	AVBA	NNF
Baccharis pilularis	coyote brush	BAPI	NP
Bowlesia incana	hoary bowlesia	BOIN3	NF
Bromus diandrus	ripgut brome	BRDI	NNF
Bromus madritensis ssp. *rubens*	foxtail chess	BRMAR	NNF
Camissoniopsis micrantha	small primrose	CAMI	NF
Cardionema ramosissimum	sand mat	CARA	NP
Carex sp.	sedge	CA	NP
Carpobrotus edulis	hottentot fig	CAED	NNP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Centaurea melitensis	tocalote	CEME	NNF
Chorizanthe diffusa	diffuse spineflower	CHDI	NF
Chorizanthe pungens var. *pungens**	Monterey spineflower	CHPUP	NF
Cirsium occidentale	cobwebby thistle	CIOC	NP
Cordylanthus rigidus ssp. *littoralis**	seaside bird's-beak	CORIL	NF
Corethrogyne filaginifolia	common sandaster	COFI	NP
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Croton californicus	California croton	CRCA	NP
Cryptantha sp.	cryptantha	CR	NF
Diplacus aurantiacus	sticky monkeyflower	DIAU	NP
Eriastrum virgatum	virgate eriastrum	ERVI	NF
Ericameria ericoides	mock heather	ERER	NP
*Ericameria fasciculata**	Eastwood's goldenbush	ERFA	NP
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium botrys	long-beaked filaree	ERBO	NNF
Erodium cicutarium	red-stemmed filaree	ERCI	NNF
Festuca myuros	rattail sixweeks grass	FEMY	NNF
Festuca octoflora	sixweeks grass	FEOC	NF
Frangula californica	California coffeeberry	FRCA	NP

Table 9-105. Species Observed on HA 38, 2022

Scientific Names	Common Names	Code	Category
Fritillaria affinis	checker lily	FRAF2	NF
Gamochaeta ustulata	purple cudweed	GAUS	NP
Garrya elliptica	coast silk tassel	GAEL	NP
Gilia tenuiflora ssp. *arenaria**	sand gilia	GITEA	NF
Heterotheca grandiflora	telegraph weed	HEGR	NF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Hypochaeris glabra	smooth cat's ear	HYGL	NNF
Hypochaeris radicata	rough cat's ear	HYRA	NNP
Lessingia pectinata	common lessingia	LEPE	NF
Logfia gallica	daggerleaf cottonrose	LOGA	NNF
Lomatium parvifolium	coastal biscuitroot	LOPA	NP
Lupinus chamissonis/albifrons	silver bush lupine	LUCH/LUAL	NP
Lupinus truncatus	Nuttall's annual lupine	LUTR	NF
Lysimachia arvensis	scarlet pimpernel	LYAR	NNF
Navarretia atractyloides	Holly-leaf navarretia	NAAT	NF
Nuttallanthus texanus	blue toadflax	NUTE	NF
Plagiobothrys sp.	popcorn flower	PL	NF
Plantago erecta	California plantain	PLER	NF
Polycarpon tetraphyllum var. *tetraphyllum*	four-leaved allseed	POTET	NNF
Pseudognaphalium ramosissimum	pink everlasting	PSRA	NP
Pteridium aquilinum var. *pubescens*	western bracken fern	PTAQP	NP
Rumex acetosella	sheep sorrel	RUAC	NNP
Salvia mellifera	black sage	SAME	NP
Senecio vulgaris	common groundsel	SEVU	NNF
Solanum umbelliferum	blue witch	SOUM	NP
Toxicodendron diversilobum	poison oak	TODI	NP

* HMP species

9.14.2.3 Vegetative Cover

Burleson surveyed two line-intercept transects at HA 38. Transect 1 is 50 m and Transect 2 is 38.5 m. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 34.50%. The mean vegetative cover by native shrubs and perennials was lower in 2022 than 2019 by 14.72%. Table 9-106 summarizes vegetative cover and Table 9-107 presents vegetative cover by species. Figure 9-41 presents the percent cover of dominant species at HA 38 in 2016, 2017, 2018, 2019 and 2022.

Table 9-106. Transect Survey Summary for HA 38

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA38T01	28.96	28.96	0.00	53.90	40.76
HA38T02	41.69	41.69	0.00	62.10	33.90
Site Average*	**34.50**	**34.50**	**0.00**	**57.47**	**37.77**

* Transect lengths are not equal. Site averages are weighted to reflect differing lengths.

Table 9-107. Transect Survey Results for HA 38 by Species

Transect	ACGL (%)	ADFA (%)	ARMO* (%)	ARPU* (%)	COFI (%)	CRSC (%)	ERCO (%)	ERFA* (%)
HA38T01	3.60	8.90	3.32	1.98	1.24	3.18	0.64	1.28
HA38T02	0.31	0.00	0.00	2.47	0.47	5.53	0.00	0.00
SITE AVERAGE‡	2.17	5.03	1.88	2.19	0.90	4.20	0.36	0.72

Table 9-107 (continued). Transect Survey Results for HA 38 by Species

Transect	HOCU (%)	LUCH/ LUAL† (%)	PSRA (%)	PTAQP (%)	SAME (%)	SOUM (%)	TODI (%)	TH (%)	BG (%)
HA38T01	0.54	2.52	0.00	1.76	0.00	0.00	0.00	53.90	40.76
HA38T02	2.91	12.91	0.52	3.64	5.84	0.26	6.83	62.10	33.90
SITE AVERAGE‡	**1.57**	**7.04**	**0.23**	**2.58**	**2.54**	**0.11**	**2.97**	**57.47**	**37.77**

* HMP species

† Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of transect data and comparison to the success criteria (see section 6.1.4).

‡ Transect lengths are not equal. Site averages are weighted to reflect differing lengths.

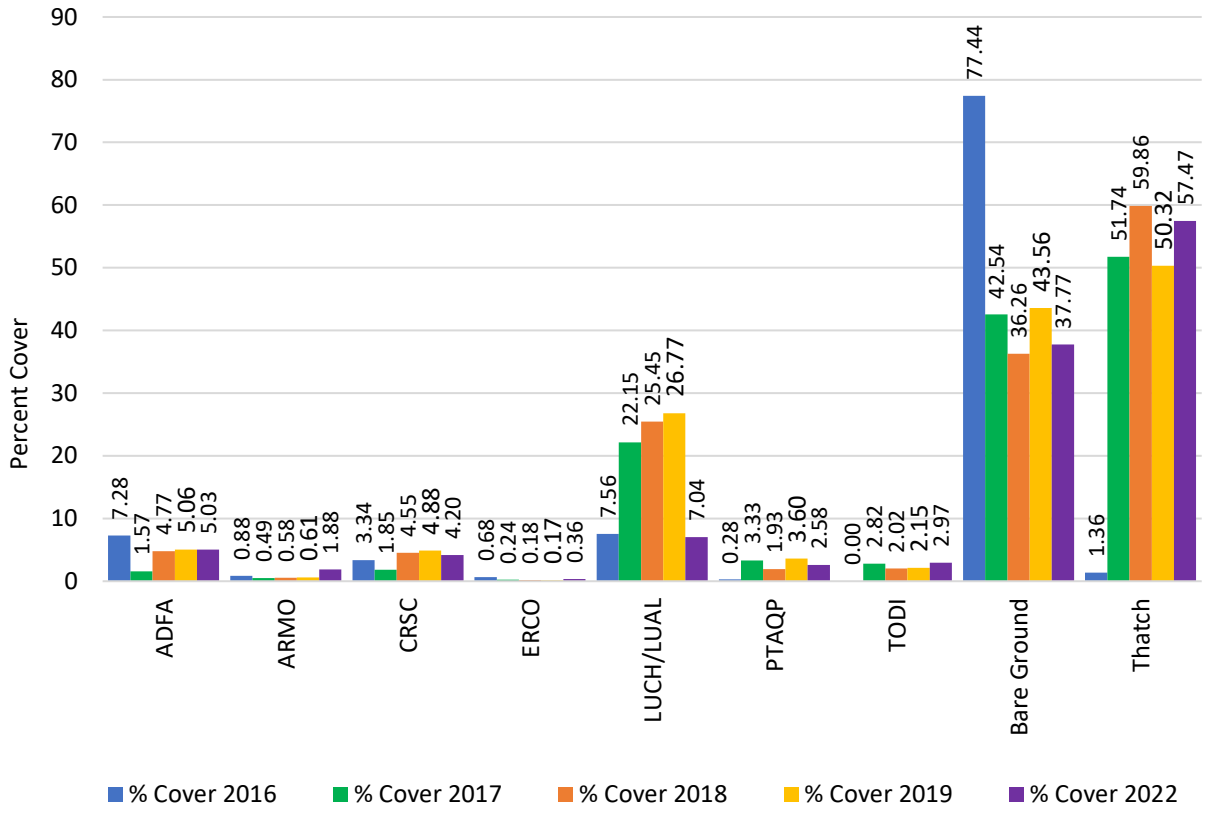


Figure 9-41. Percent Cover of Dominant Species at HA 38 in 2016, 2017, 2018, 2019, and 2022.

9.14.3 Monitoring Results Discussion

9.14.3.1 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 38. The SSRP baseline density class for Monterey spineflower was low. Year 5 and year 8 Monterey spineflower restoration plot results show that the density met the success criterion under Objective 3 for three out of five plots. In addition, Monterey spineflower was present outside the restoration plots. Discrete patches, with density that met or exceeded the success criterion, covered 0.026 acres of HA 38.

Sand gilia density was within the acceptable limit for HMP annual density at HA 38. The SSRP baseline density class for sand gilia was low. Year 2 and year 5 sand gilia restoration plot results show that the density met the success criterion under Objective 3 for five out of five plots. In addition, sand gilia was present outside the restoration plots. One discrete patch, with density that met or exceeded the success criterion, covered 0.001 acres of HA 38.

Seaside bird's beak was within the acceptable limit for HMP annual density at HA 38. The SSRP baseline density class for seaside bird's beak was low. Year 2 seaside bird's beak restoration plot results show that the density met the success criterion under Objective 3. Seaside bird's beak was not observed outside of the restoration plot.

Monterey spineflower, sand gilia, and seaside bird's beak restoration plot results indicated that all HMP species met the success criterion in 2022.

9.14.3.2 Species Richness

Deerweed, chamise, Hooker's manzanita, Monterey manzanita, sandmat manzanita, shaggy-bark manzanita, coyote brush, Monterey ceanothus, and black sage were present. HA 38 included 31 native shrub and perennial species and met the success criterion for Objective 1.

9.14.3.3 Vegetative Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For Objective 1, the data must meet or exceed 20% for native species listed as part of the plant palette. This list includes 23 shrub and perennial species presented in Table 2 of the HA 38 SSRP (Burleson, 2013). These species contributed 27.71% cover to the HA, a decrease of 15.76% since 2019; however, this success criterion was met (see Figure 9-42). Percent cover of silver bush lupine decreased by 19.73% causing overall cover of plant palette species to decrease considerably since 2019. All other dominant species had consistent or increasing cover values (see Figure 9-41). The cause of the silver bush lupine cover decline in this case is not known, but sporadic patchy die-off of bush lupine species has been well documented, often due to insect herbivory (Harrison, 2003; Strong *et al*., 1995).

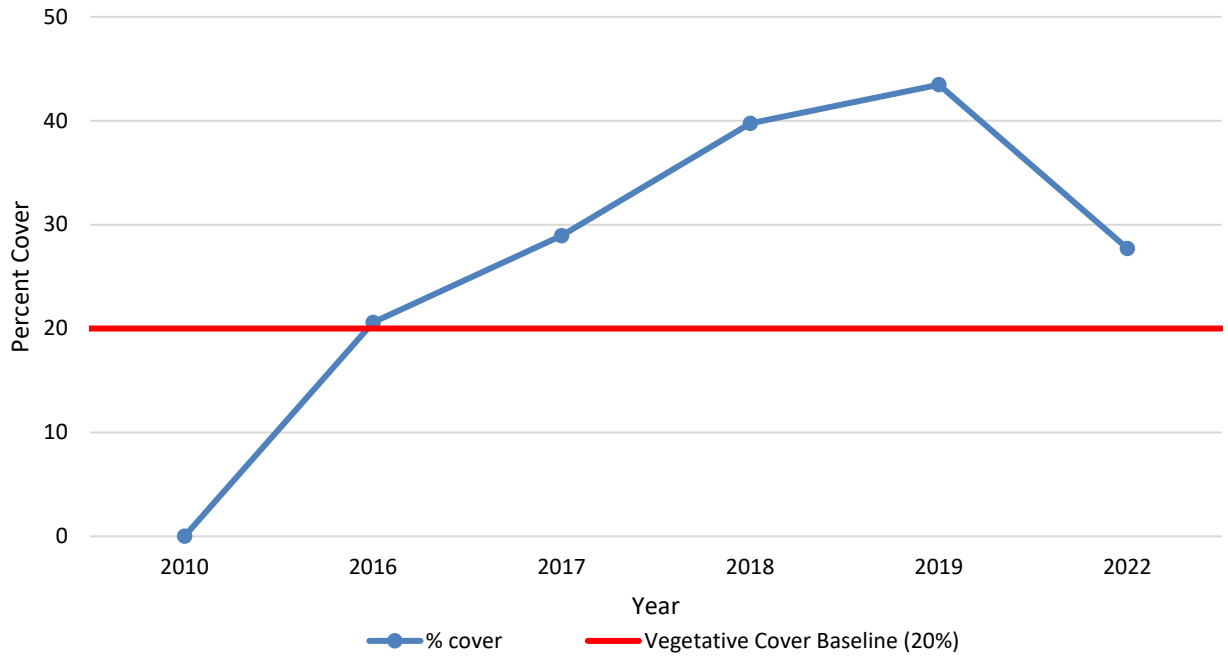


Figure 9-42. Native Vegetative Cover Compared to the Success Criterion at HA 38

Objective 2 considers the percent cover of non-native target weeds. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 2. Cover class 2 ranges from 1-5% of absolute cover. The HMP shrub species at HA 38 provided an absolute cover of 4.07%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 38, this means a vegetative cover average of at least 1% cover for Monterey manzanita, 1% for Monterey ceanothus, 1% for Hooker's manzanita, and 4% for sandmat manzanita. The average vegetative cover for Monterey manzanita was 1.88%, Monterey ceanothus was 0.00%, Hooker's manzanita was 0.00%, and sandmat manzanita was 2.19%. Only Monterey manzanita was within the acceptable limit; therefore, the success criterion was not met.

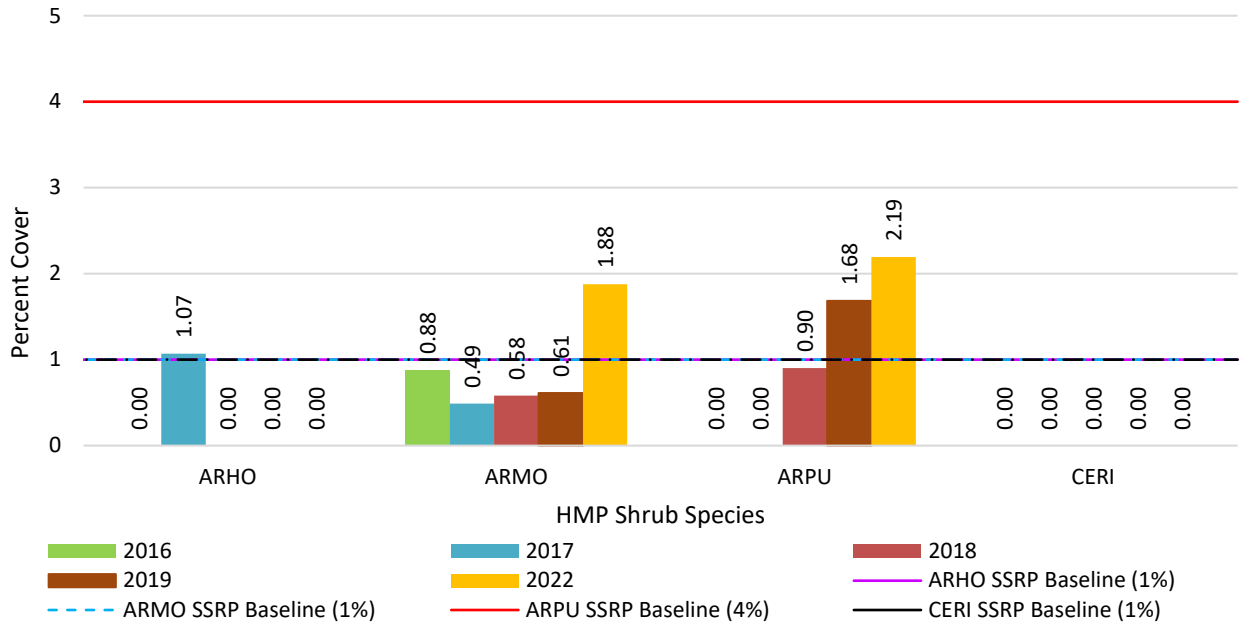


Figure 9-43. HMP Shrub Species Comparison to Success Criteria at HA 38

9.14.4 HA Status Discussion

HA 38 was in year 8 of monitoring in 2022. The site met five of six success criteria in 2022. Per recommendations in the 2017 Annual Report, a restoration plot for seaside bird's beak was established and the sand gilia restoration plots were reseeded in the 2020/2021 season to support the HMP annual density success criterion. The Army also planted Monterey ceanothus in the 2020/2021 season to support the HMP shrub cover by species success criterion. The Army has no further recommendations at this time. Overall, HA 38 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-15 and Appendix F, page F-4).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2027 (see Table 9-101). Table 9-108 summarizes the status of the HA including which success criteria were met and likelihood of meeting criteria by year 13.

Table 9-108. Status for Achieving Success Criteria at HA 38

Success Criterion	Category	Acceptable Limits	Year 5 (2019) Met	Year 8 (2022) Met	Likelihood of Achieving Success by Year 13 (2027)	Notes
Objective 1 – No. 1	Species richness	9 Required species: ACGL, ADFA, ARHO, ARMO, ARPU, ARTO, BAPI, CERI, SAME	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 20%	Yes	Yes	HIGH	**Year 5**: 43.47% **Year 8**: 27.71% (LUCH/LUAL cover decreased by 19.74% between years 5 and 8)
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 2: 1-5%	Yes	Yes	HIGH	**Year 5**: 2.29% **Year 8**: 4.07%
Objective 3 – No. 4	HMP shrub cover by species	ARMO ≥ 1% CERI ≥ 1% ARHO ≥ 1% ARPU ≥ 4%	No	No	HIGH for ARMO LOW for CERI LOW for ARHO MODERATE for ARPU	**Year 5**: ARMO 0.61% CERI 0.00% ARHO 0.00% ARPU 1.68% **Year 8**: ARMO 1.88% CERI 0.00% ARHO 0.00% ARPU 2.19% (CERI planted in 2020/2021)
Objective 3 – No. 4	HMP annual density	Low density for CHPUP, GITEA, and CORIL	Yes for GITEA Yes for CHPUP No for CORIL	Yes	NA	(CORIL plot established in 2020/2021. Monitoring will occur in 2023, 2024, 2025, and 2028)

9.15 HA 39/40

HA 39/40 was used by the Army as a small-arms firing range. Soil remediation was completed in 2010; approximately 6,500 cubic yards of soil were excavated from 2.4 acres (Shaw, 2008). HA 39/40 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 39/40 is broken up into four distinct areas. Plots 1-4 are located in the upland zone of a vernal pool with surface water runoff from the south draining towards the north into the vernal pool. Plot 1 is grassland habitat, Plot 2 is a combination of grassland and wet meadow, Plot 3 is wet meadow which can be submerged depending on the water-year, and Plot 4 is a combination of coastal scrub and grassland which includes the active restoration area.

The SSRP plant palettes for this site were based on baseline data from transects within the footprint as well as supplemental species appropriate for each plot (Shaw, 2009a). Baseline transects were established in Plots 1, 3, and 4. In baseline, native species cover for Plot 1 was 24.1%, Plot 3 was 22.7%, and Plot 4 was 10.3%. Plot 1 had four native species present and was dominated by clustered field sedge (*Carex praegracilis*) and rattail sixweeks grass (*Festuca myuros*). Plot 3 had one native species present and was dominated by clustered field sedge and ripgut brome (*Bromus diandrus*). Plot 4 had 16 native species present across three transects and was dominated by ripgut brome with a mixture of non-native grasses and common yarrow (*Achillea millefolium*) and an average of approximately 1% or less of all other native species. Both ripgut brome and rattail sixweeks grass are non-native species.

HA 39/40 is located on the northeastern portion of Site 39, occurring within the Aromas formation containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 39/40 included both passive and active restoration consisting of hand broadcast non-irrigated seed and installing native container-grown plants. HA 39/40 is relatively flat to moderately sloped and has some potential for erosion; special care should be taken to prevent runoff from entering the vernal pool.

Restoration at HA 39/40 initially occurred between 2011 and 2013. Quantitative monitoring began in 2013, additional seed was broadcast in 2020, and additional plants were installed in 2021. HA 39/40 was monitored for eleven years by photo documentation and site visits, eight years for HMP annual density in plots, five years for HMP annual density across the HA, and four years for species richness and vegetative cover (see Table 9-109). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-44 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 39/40 are summarized in Table 9-110.

Table 9-109. Historic Summary of Restoration and Monitoring Activities at HA 39/40

Activity	Monitoring Years											
			1	2	3	4	5	6	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022	2025
Restoration: Active, Passive, Erosion Control	●	●	●						●	●		
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●	●			
Sand Gilia Plots			●	●	●	●	●	●	●	●		
Seaside Bird's Beak Plots			●	●	●	●	●	●	●			
HMP Annual Density across HA						●	●	●	●	●		
Species Richness						●	●	●	●			●
Vegetative Cover						●	●	●	●			●

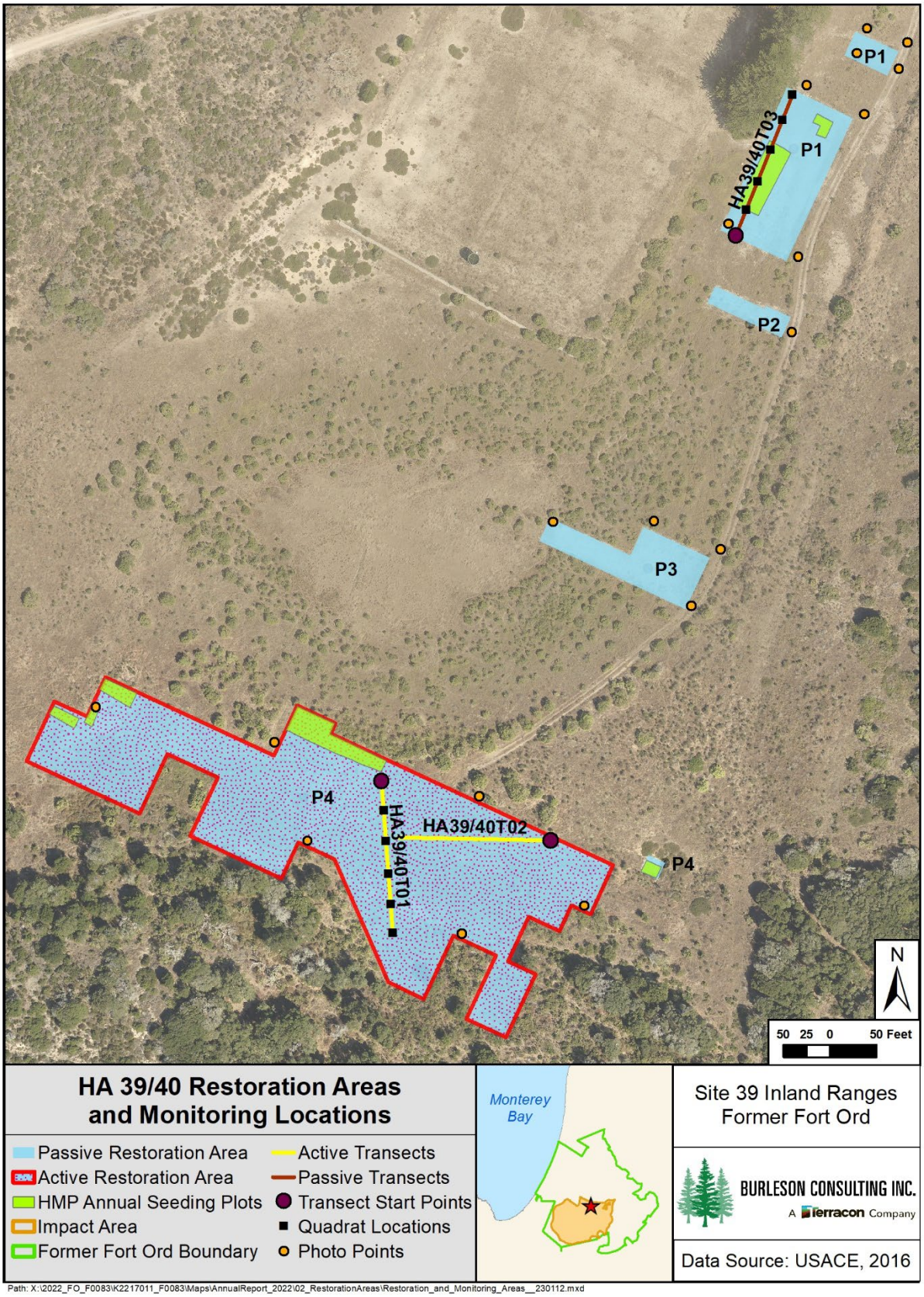


Figure 9-44. HA 39/40 Restoration Areas and Monitoring Locations Map

Table 9-110. Success Criteria and Acceptable Limits for Restoration of HA 39/40

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			common yarrow coyote brush sedge saltgrass blue wild-rye California poppy rush wedge-leaved horkelia yellow bush lupine silver bush lupine deerweed sticky monkeyflower
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP†
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline surveys indicate that non-native weeds were present in lands adjacent to HA-39/40. Therefore, no more than 5% non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 1 (0% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Baseline data indicated no HMP shrubs. Therefore, no HMP shrubs need to be present at this restoration site.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low Sand gilia density class: Low Seaside bird's beak density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† Each habitat zone (P1-P4) will be evaluated separately based on its unique plant palette

9.15.1 Restoration Activities

Burleson performed passive restoration at HA 39/40 in 2012, 2013, and 2020. The total amount of seed broadcast on site was 143.533 lb compared to 77.270 lb prescribed in the SSRP. Table 9-111 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species Monterey spineflower, sand gilia, and seaside bird's beak. Two plots of Monterey spineflower, five plots of sand gilia, and one plot of seaside bird's beak were chosen based on having suitable habitat for the HMP annuals and adjacent extant populations (see Figure 9-44).

Table 9-111. Summary of Passive Restoration Activities for HA 39/40

Species	Pounds of Seed Broadcast					
	SSRP Target	2012 (Jan)	2012 (Dec)	2013	2020	Total by Species
ACGL	3.820	1.900	1.914	-	16.000	19.814
ACMI	2.290	1.200	1.140	-	16.000	18.340
ARDO	0.210	0.105	0.105	-	-	0.210
BAPI	0.340	-	0.618	-	-	0.618
CA	0.210	-	-	-	-	-
CHPUP*	0.080	0.070	0.040	-	-	0.110
CORIL*	0.080	0.046	0.040	-	-	0.086
CRCA	0.550	0.300	0.275	-	-	0.575
DIAU	0.220	0.700	0.177	-	-	0.877
DISP	0.210	-	-	-	-	-
ELGL	22.140	-	23.400	-	24.000	47.400
ESCA	2.290	-	0.551	-	-	0.551
GITEA*	0.080	-	0.018	0.021	-	0.039
HOCU	4.500	2.300	2.251	-	-	4.551
HO	22.140	0.000	26.918	-	-	26.918
JUPA	0.550	0.400	0.275	-	-	0.675
LUAL	2.290	0.900	1.387	-	-	2.287
LUAR	2.290	1.300	1.146	-	-	2.446
LUNA	2.460	-	2.461	-	-	2.461
SOVE	0.550	0.300	0.275	-	-	0.575
STCE	4.580	-	-	-	-	-
STPU	4.840	2.200	2.420	-	10.000	14.620
TRWI	0.550	-	0.380	-	-	0.380
TOTAL	**77.270**	**11.721**	**65.791**	**0.021**	**66.000**	**143.533**

* HMP species

Burleson completed active restoration in Plot 4 of HA 39/40 in 2012, 2013, and 2021. The total number of plants installed at HA 39/40 was 3,518 compared to 2,130 prescribed in the SSRP. Table 9-112 summarizes the plants installed during active restoration.

Table 9-112. Summary of Active Restoration Activities at Plot 4 for HA 39/40

Species	Number of Individual Plants				
	SSRP Target	2012	2013	2021	Total by Species
ACGL	150	150	-	-	150
ACMI	380	200	-	-	200
BAPI	75	75	-	200	75
CA	-	-	623	100	623
DIAU	75	75	-	-	75
DISP	-	-	240	100	240
ELGL	300	300	-	-	300
ESCA	250	-	260	-	260
HOCU	150	150	-	-	150
JUPA	-	-	-	100	100
LUAL	75	-	75	-	75
LUAR	75	75	-	100	75
LUNA	150	-	150	-	150
STCE	250	285	-	-	285
STPU	200	160	-	100	160
TOTAL	**2,130**	**1,470**	**1,348**	**700**	**3,518**

9.15.2 Monitoring Results

HA 39/40 was in year 10 of monitoring in 2022. Year 10 does not require monitoring and only site visits and photo documentation were completed (see Appendix D, page D-16).

9.15.3 HA Status Discussion

In 2017, year 5 of monitoring, and 2020, year 8 of monitoring, HA 39/40 met three of four success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 39/40 has a low chance of meeting the native vegetation cover criterion (see Table 9-113).

Recommendations were developed from a combination of prior recommendations and the restoration efforts completed in 2021. Per recommendations in the 2017 Annual Report, production seed mix was broadcast and coyote brush and yellow bush lupine were planted in Plots 1 and 2. *Juncus* sp., clustered field sedge, and saltgrass (*Distichlis spicata*) were planted in Plot 3. Furthermore, the SSRP success criteria specified that each habitat zone (Plots 1-4) will be evaluated separately based on its unique plant pallet. Currently, only Plots 1 and 4 have transects; the Army recommends establishing a transect in plot 3 to better assess the restoration progress at the site. Based on qualitative evaluation, Plots 1 and 2 are similar, therefore the transect in Plot 1 is representative of Plots 1 and 2. Additionally, the Army recommends broadcasting seed appropriate for each habitat zone in barren areas to address the native vegetation cover criterion. Overall, the site needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-16).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 13, 2025 (see Table 9-109). Reevaluation of the success criteria may be considered at that time.

Table 9-113. Status for Achieving Success Criteria at HA 39/40

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	12 required species: ACMI, BAPI, Carex sp., DISP, ELGL, ESCA, Juncus sp., HOCU, LUAR, LUCH/LUAL, AGCL, DIAU	Yes	Yes	HIGH	**Year 5**: met **Year 8**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	LOW	**Year 5**: 7.98% **Year 8**: 17.10% (AMP planting occurred in 2021)
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 1: 0%	NA	NA	NA	NA, no HMP shrubs at baseline
Objective 3 – No. 4	HMP shrub cover by species	NA	NA	NA	NA	NA, no HMP shrubs at baseline
Objective 3 – No. 4	HMP annual density	Low density for CHPUP, GITEA, and CORIL	Yes	Yes	NA	(Year 13 monitoring not required)

9.16 HA 43

HA 43 was used by the Army as a long-distance small-arms firing range. Munitions removal and soil remediation were completed in 2010; 150 cubic yards of lead-contaminated soil were excavated from 0.09 acres. HA 43 rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 43 is relatively flat with surface water runoff draining to the west. Adjacent lands are high quality habitat areas which contain intact native vegetation that may promote natural recruitment within restoration areas.

HA 43 is located on the north central portion of Site 39, occurring within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 43 consisted of hand broadcasting non-irrigated seed and annual weed management activities. HA 43 is relatively flat with little potential for erosion.

Restoration at HA 43 occurred in 2011, 2012, 2019, 2020, 2021, and 2022. Quantitative monitoring began in 2013. HA 43 was monitored for 12 years by photo documentation and site visits; nine years for HMP annual density in plots; six years for HMP annual density across the HA; and five years for species richness and vegetative cover (see Table 9-114). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-45 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 43 are summarized in Table 9-115.

Table 9-114. Historic Summary of Restoration and Monitoring Activities at HA 43

Activity	Monitoring Years												
			1	2	3	4	5	6	7	8	9	10	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2025
Restoration: Active and Passive	●	●							●	●	●	●	
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●		●			
Sand Gilia Plots			●	●	●	●	●	●		●	●	●	
Seaside Bird's Beak Plots			●	●	●	●	●	●		●			
HMP Annual Density across HA						●	●	●		●	●	●	
Species Richness						●	●	●	●	●			●
Vegetative Cover						●†	●	●	●	●			●

† Vegetative cover was monitored using quadrats in 2016

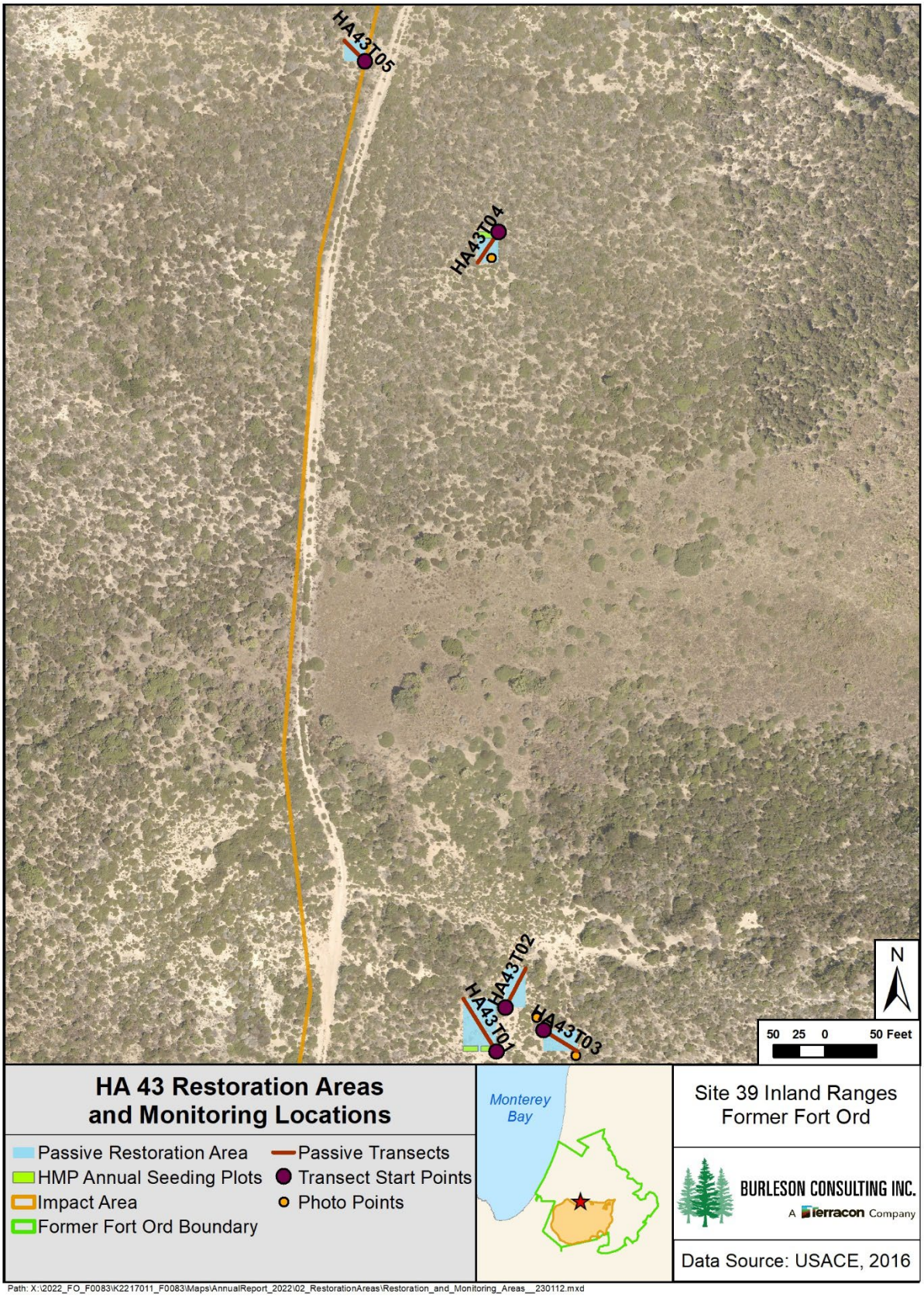


Figure 9-45. HA 43 Restoration Areas and Monitoring Locations Map

Table 9-115. Success Criteria and Acceptable Limits for Restoration of HA 43

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise sandmat manzanita† shaggy-bark manzanita coyote brush Monterey ceanothus† dwarf ceanothus mock heather golden yarrow peak rush-rose wedge-leaved horkelia deerweed sticky monkeyflower coffeeberry black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 6.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 15.
			Eastwood's goldenbush percent cover, as an average of transect data, must be equal or greater than 1.

Table 9-115. Success Criteria and Acceptable Limits for Restoration of HA 43

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Medium Sand gilia density class: Medium Seaside bird's beak density class: Medium

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.16.1 Restoration Activities

Burleson performed passive restoration at HA 43 in 2011, 2012, 2019, and 2020. The total amount of seed broadcast on site was 5.940 lb compared to 1.943 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast as a corrective measure to help the site meet the native vegetation cover criterion. Table 9-116 summarizes the SSRP seed target and the amount of seed applied by year and species. Burleson performed passive restoration for the HMP annual species sand gilia, seaside bird's beak, and Monterey spineflower. One plot for each species was chosen based on suitable habitat for the HMP annuals and adjacent extant populations (see Figure 9-45).

Table 9-116. Summary of Passive Restoration Activities for HA 43

Species	Pounds of Seed Broadcast					
	SSRP Target	2011	2012	2019	2020	Total by Species
ACMI	-	-	-	0.270	0.800	1.070
ACGL	0.180	0.091	0.099	-	0.800	0.990
ADFA	0.090	0.470	0.050	-	-	0.520
ARPU*	0.090	0.049	0.059	-	-	0.108
ARTO	0.180	0.092	0.102	-	-	0.194
BAPI	0.014	-	0.008	-	-	0.008
CERI*	0.090	0.052	0.055	-	-	0.107
CHPUP*	0.001	0.011	0.002	-	-	0.013
CORIL*	0.001	0.001	0.007	-	-	0.008
CRSC	0.090	0.049	0.069	-	-	0.118
ELGL	-	-	-	0.720	-	0.720
ERCO	0.027	0.016	0.023	-	-	0.039
ERFA*	0.009	0.007	0.006	-	-	0.013
FRCA	0.090	0.046	0.046	-	-	0.092
GITEA*	0.001	-	0.002	-	0.001	0.003
HO	0.810	-	0.836	-	-	0.836
HOCU	0.180	0.091	0.094	0.360	-	0.545
SAME	0.090	0.050	0.056	-	-	0.106
STPU	-	-	-	0.450	-	0.450
TOTAL	**1.943**	**1.025**	**1.514**	**1.800**	**1.601**	**5.940**

* HMP species

No active restoration was prescribed at HA 43; however, AMP planting events occurred in 2019 and 2022 per recommendations made in the 2018 Annual Report (Burleson, 2019). A total of 119 plants were installed at HA 43. Table 9-117 summarizes the plants installed during active restoration.

Table 9-117. Summary of Active Restoration Activities for HA 43

Species	Number of Individual Plants		
	2019	2022	Total by Species
ADFA	10	-	10
CERI*	20	-	20
DIAU	14	-	14
ERFA*	-	75	75
TOTAL	**44**	**75**	**119**

*HMP species

9.16.2 Monitoring Results

HA 43 was in year 10 of monitoring in 2022. Year 10 does not require monitoring, however, HMP annual density surveys, photo documentation, and site visits were completed. The sand gilia plot was reseeded in December 2020 due to low density found in prior monitoring years. Two additional monitoring years were scheduled to ensure HA 43 meets the target density for sand gilia per recommendations made in the 2020 Annual Report (Burleson, 2021). 2022 was the final year of scheduled monitoring. The Army recommended monitoring the sand gilia restoration plot for an additional two years in 2021 and 2022 to observe the site's response to the corrective measure.

9.16.2.1 HMP Annual Density

Sand gilia restoration plots were monitored for density at HA 43.

One sand gilia plot was surveyed for year 10 density at HA 43 in 2022. The plot is numbered 1 on Figure 9-47 and located in the southern part of the site. Sand gilia density was low at Plot 1. Figure 9-46 presents sand gilia restoration plot densities for HA 43.

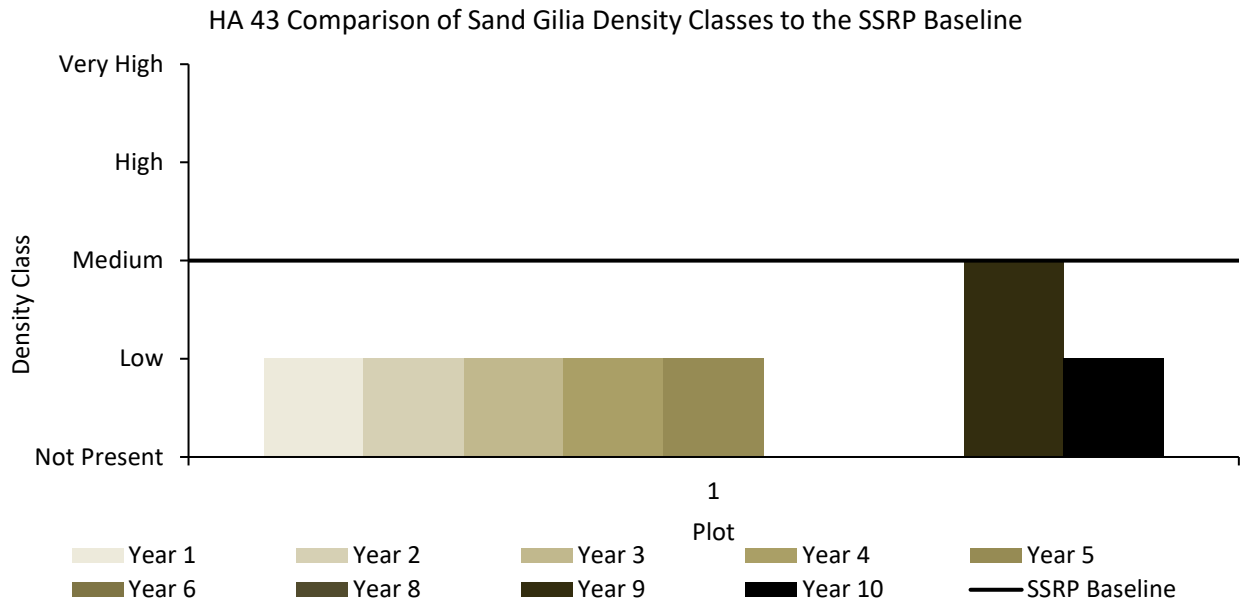


Figure 9-46. HA 43 Comparison of Sand Gilia Density Classes to the SSRP Baseline for Plot 1

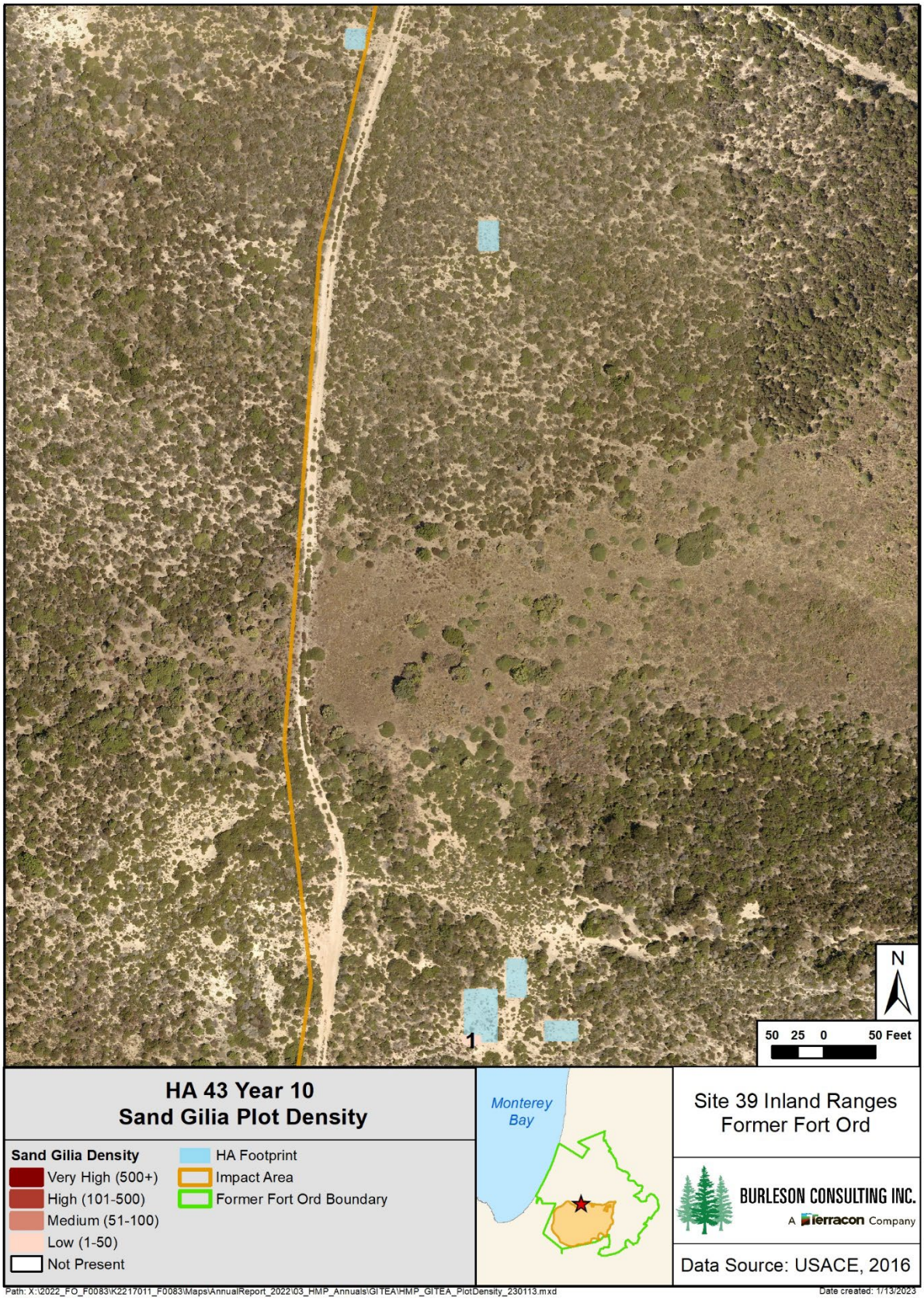


Figure 9-47. HA 43 Year 10 Sand Gilia Plot Density Map

HMP annual density monitoring included mapping discrete patches of HMP annuals within the restoration area but outside of the HMP annual restoration plots. This survey was completed for sand gilia at HA 43.

Sand gilia was not observed outside the restoration plot in 2022 which is consistent with monitoring results in 2021.

9.16.3 Monitoring Results Discussion

9.16.3.1 HMP Annual Density

Sand gilia density was below the acceptable limit for HMP annual density at HA 43. The SSRP baseline density class for sand gilia was medium. Year 10 sand gilia restoration plot results show that the density did not meet the success criterion under Objective 3. Sand gilia was not observed outside of the restoration plot. HA 43 did not meet the success criterion for sand gilia density in 2022.

9.16.4 HA Status Discussion

In 2017, year 5 of monitoring, HA 43 met two out of six success criteria. In 2020, year 8 of monitoring, the site met three of six success criteria. Overall, the site is positively trending toward meeting success criteria but is not likely to meet all criteria by year 13 of monitoring, 2025. HA 43 did not meet the HMP annual density criterion for sand gilia despite reseeding efforts. HA 43 has a moderate chance of meeting the native vegetation cover criterion and a low chance of meeting the HMP shrub cover by species criterion (see Table 9-118).

Recommendations were developed from a combination of prior recommendations and restoration efforts. Per recommendations in the 2016 Annual Report, sticky monkeyflower, Monterey ceanothus, and chamise were installed during the 2018/2019 season to support species richness (Burleson, 2017). Per recommendations in the 2018 Annual Report, additional seed was broadcast in the sand gilia restoration plot to support HMP annual density in the 2020/2021 season. The Army recommended monitoring the sand gilia restoration plot for an additional year in 2022 to observe the site's response to the corrective measure. Additionally, the Army planted Eastwood's goldenbush to support HMP shrub cover in the 2021/2022 season. The Army recommends additional seed broadcast in barren areas to address the native vegetation cover criterion. We do not recommend any additional sand gilia seeding after marginal success in previous reseeding attempts. HA 43 was last monitored for vegetative cover in 2020 and AMP planting occurred in the 2021/2022 wet season. The site needs time to respond to the restoration effort. A qualitative overview was documented by reference photo points (see Appendix D, page D-17).

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects in year 13, 2025 (see Table 9-114). Table 9-118 summarizes the status of HA 43 including which success criteria were met and likelihood of meeting criteria at year 13.

Table 9-118. Status for Achieving Success Criteria at HA 43

Success Criterion	Category	Acceptable Limits	Year 5 (2017) Met	Year 8 (2020) Met	Likelihood of Achieving Success by Year 13 (2025)	Notes
Objective 1 – No. 1	Species richness	14 required species: ADFA, ARPU, ARTO, BAPI, CERI, CEDE, ERER, ERCO, CRSC, HOCU, ACGL, DIAU, FRCA, SAME	No	Yes	HIGH	**Year 5**: DIAU absent **Year 8**: met (AMP planting occurred in 2018/19)
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	No	MODERATE	**Year 5**: 25.38% **Year 8**: 30.31%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	Yes	HIGH	**Year 5**: 0.00% **Year 8**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Yes	Yes	HIGH	**Year 5**: 10.60% **Year 8**: 20.14%
Objective 3 – No. 4	HMP shrub cover by species	CERI ≥ 15% ARPU ≥ 6% ERFA ≥ 1%	No for CERI Yes for ARPU No for ERFA	No for CERI Yes for ARPU No for ERFA	LOW for CERI HIGH for ARPU MODERATE for ERFA	**Year 5**: CERI 2.50% ARPU 8.10% ERFA 0.00% **Year 8**: CERI 3.45% ARPU 16.69% ERFA 0.00% (ERFA planted in early 2022)
Objective 3 – No. 4	HMP annual density	Medium density for CHPUP, GITEA, and CORIL	Yes for CHPUP Yes for CORIL No for GITEA	Yes for CHPUP Yes for CORIL No for GITEA	NA	**Year 5**: not met **Year 8**: not met (GITEA was also monitored in 2022 and did not meet criterion) (Year 13 monitoring not required)

9.17 HA 44

HA 44 was used by the Army as a range for anti-tank weapons and other explosive munitions. Approximately 2,900 cubic yards of soil was excavated over 1.8 acres. HA 44 rests within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58° F and regular fog typical of maritime climates (USFS, 2007). HA 44 is relatively flat with a southwest aspect and is surrounded by very high-quality habitat.

HA 44 is located on the northern portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for HA 44 included both passive and active restoration consisting of hand broadcast non-irrigated seed, annual weed management activities, and installing native container-grown plants. HA 44 is relatively flat with little potential for erosion.

Restoration at HA 44 occurred in 2017, 2018, and 2020 and quantitative monitoring began in 2016. The initial monitoring in 2016 was to assess the level of natural recruitment occurring at that site. HA 44 was monitored for seven years by photo documentation and site visits, HMP annual density across the HA, species richness, and vegetative cover, and three years for plant survivorship (see Table 9-119). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-48 shows the HA footprint, restoration areas, and transect monitoring locations. The success criteria for HA 44 are summarized in Table 9-120.

Table 9-119. Historic Summary of Restoration and Monitoring Activities at HA 44

Activity	Monitoring Years								
			1	2	3	4	5	8	13
	2016	2017	2018	2019	2020	2021	2022	2025	2030
Restoration: Active and Passive		●	●		●				
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●
HMP Annual Density across HA	●	●	●	●	●	●	●	●	
Species Richness	●	●	●	●	●	●	●	●	●
Vegetative Cover	●	●	●	●	●	●	●	●	●
Plant Survivorship			●	●	●				

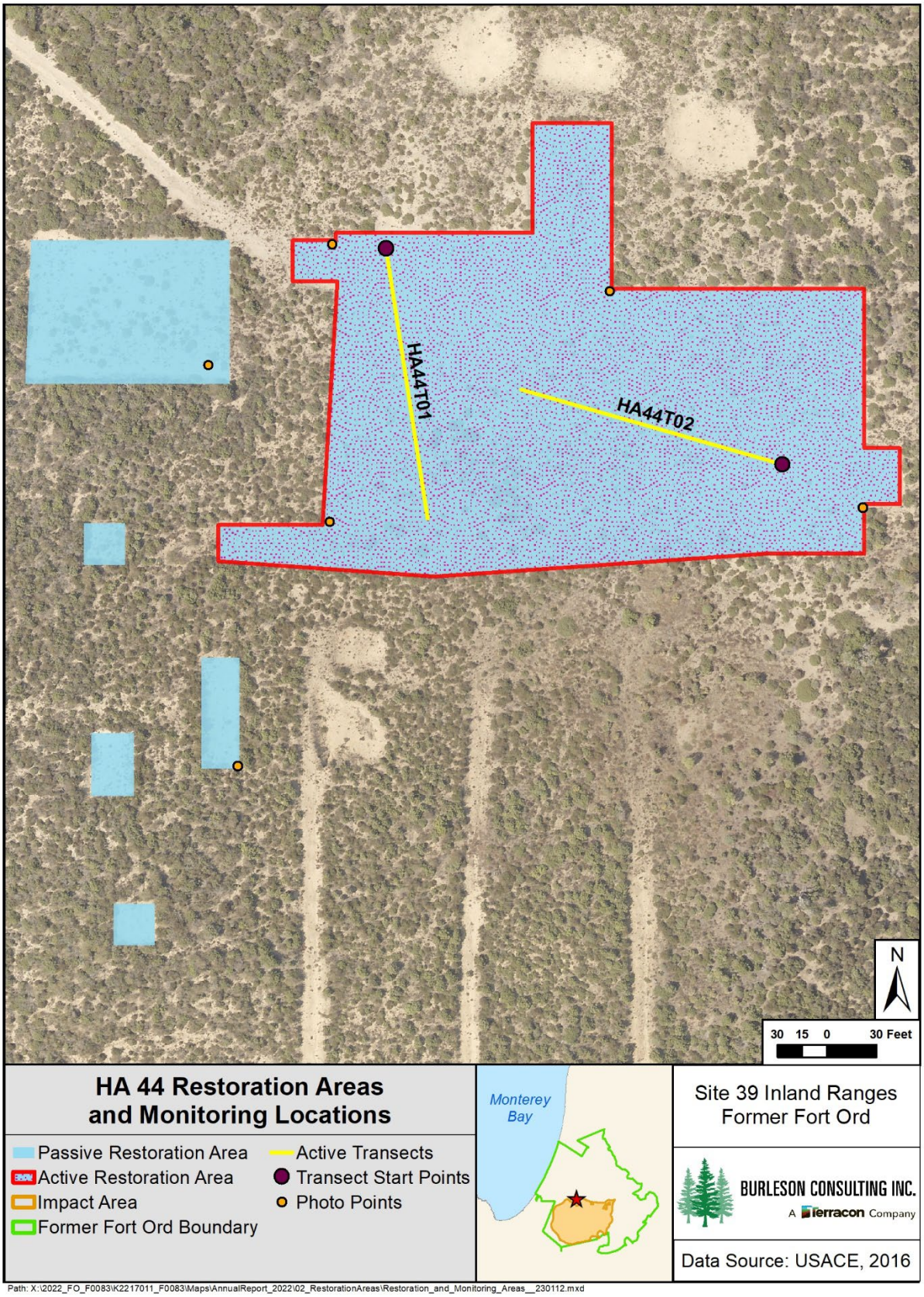


Figure 9-48. HA 44 Restoration Areas and Monitoring Locations Map

Table 9-120. Success Criteria and Acceptable Limits for Restoration of HA 44

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise sandmat manzanita† shaggy-bark manzanita Monterey ceanothus† California coffeeberry
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data indicated absence of non-native target weed species. In the event of their establishment, no more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 2.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 10 percent is acceptable.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low Sand gilia density class: Low Seaside bird's beak density class: Low

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.17.1 Restoration Activities

Burleson performed passive restoration at HA 44 in 2017, 2018, and 2020. The total amount of seed broadcast on site was 73.37 lb compared to 42.70 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-121 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-121. Summary of Passive Restoration Activities for HA 44

Species	Pounds of Seed Broadcast				
	SSRP Target	2017	2018	2020	Total by Species
ACMI	1.80	2.00	2.00	4.00	8.00
ACGL	5.50	1.69	1.00	4.00	6.69
BAPI	0.30	0.05	0.20	-	0.25
CERI*	1.80	0.25	1.00	-	1.25
CHPUP*	0.30	-	0.21	-	0.21
CRSC	4.60	0.62	2.50	-	3.12
ELGL	-	9.00	8.00	6.00	23.00
ERCO	0.50	0.07	0.30	-	0.37
FRCA	1.80	0.25	1.00	-	1.25
HO	18.20	2.48	10.00	-	12.48
HOCU	4.60	1.25	8.00	-	9.25
LUAL	1.80	0.25	1.00	-	1.25
SAME	1.80	0.25	1.00	-	1.25
STPU	-	-	5.00	-	5.00
TOTAL	**42.70**	**18.16**	**41.21**	**14.00**	**73.37**

* HMP species

Burleson completed active restoration at HA 44 in 2018. The total number of plants installed at HA 44 was 1,110, as prescribed in the SSRP. Table 9-122 summarizes the plants installed during active restoration.

Table 9-122. Summary of Active Restoration Activities for HA 44

Species	Number of Individual Plants		
	SSRP Target	2018	Total by Species
ACGL	200	31	31
ACMI	100	100	100
ADFA	40	144	144
ARPU*	30	40	40
ARTO	40	52	52
BAPI	40	87	87
CERI*	30	101	101
CRSC	150	150	150
ERCO	150	-	-
FRCA	50	300	300
HOCU	200	-	-
LUAL	50	68	68
SAME	30	37	37
TOTAL	**1,110**	**1,110**	**1,110**

* HMP Species

9.17.2 Monitoring Results

9.17.2.1 HMP Annual Density

No restoration plots were established for HMP annuals at HA 44. However, HMP annuals were mapped as a part of the meandering transect survey. This survey was completed for Monterey spineflower, sand gilia, and seaside bird's beak at HA 44.

Thirty-five individual plants and eight discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-49). Densities were low to high and the total acreage of Monterey spineflower patches with a density at or above the SSRP baseline density class of low was 0.010 acres. From 2021 to 2022, the density range and acreage above the SSRP baseline decreased.

Five individual plants and one discrete patch of sand gilia were mapped and individuals counted within the patch (see Figure 9-50). The density of the patch was low and the total acreage of sand gilia patches with a density at or above the SSRP baseline density class of low was 0.003 acres. From 2021 to 2022, the density range remained the same and the acreage above the SSRP baseline density class increased.

Twelve individual plants and three discrete patches of seaside bird's beak were mapped and individuals counted within each patch (see Figure 9-51). The density was low and the total acreage of seaside bird's beak patches with a density at or above the SSRP baseline density class of low was 0.003 acres. From 2021 to 2022, the density range and acreage above the SSRP baseline decreased.

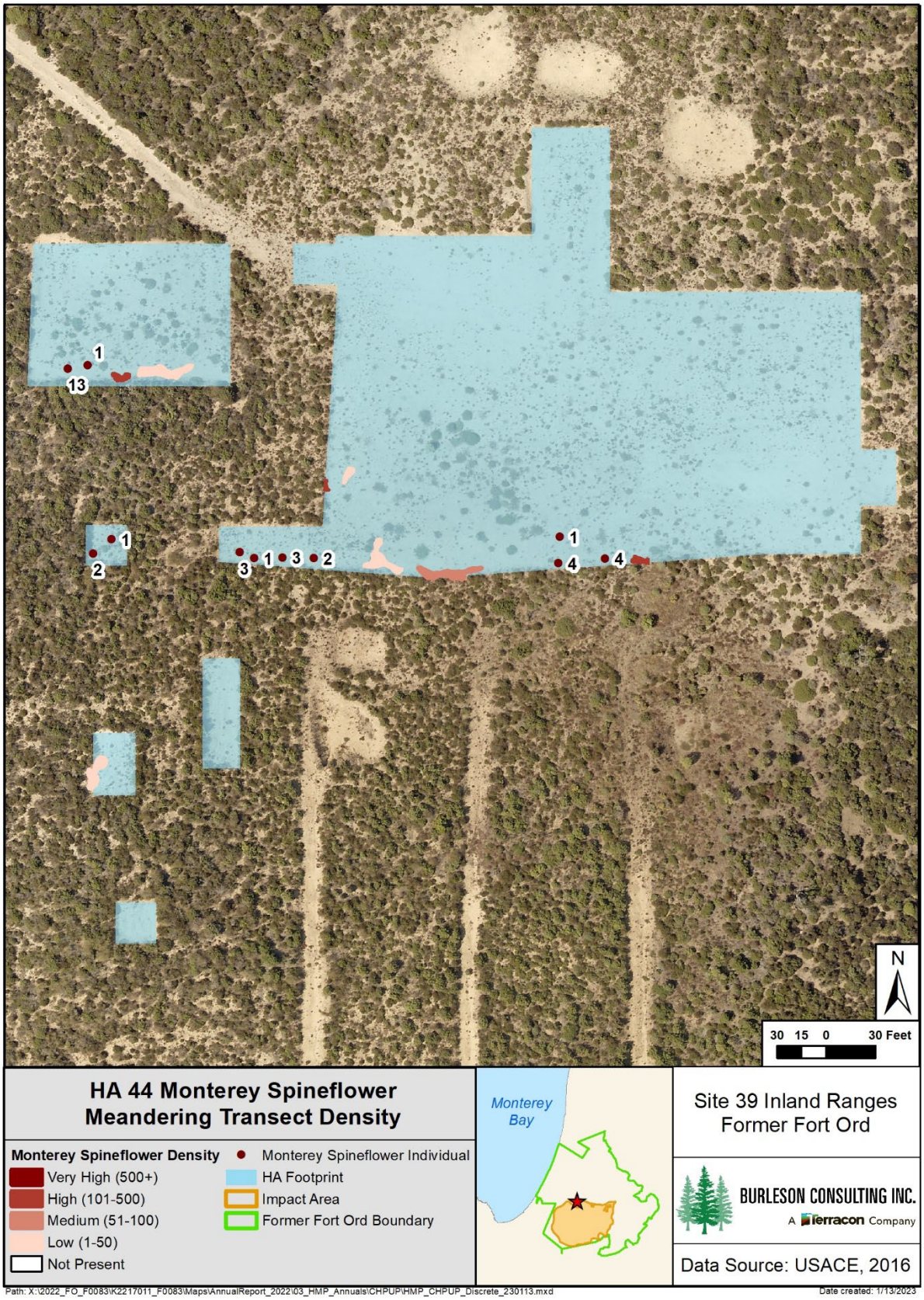


Figure 9-49. HA 44 Monterey Spineflower Meandering Transect Density Map

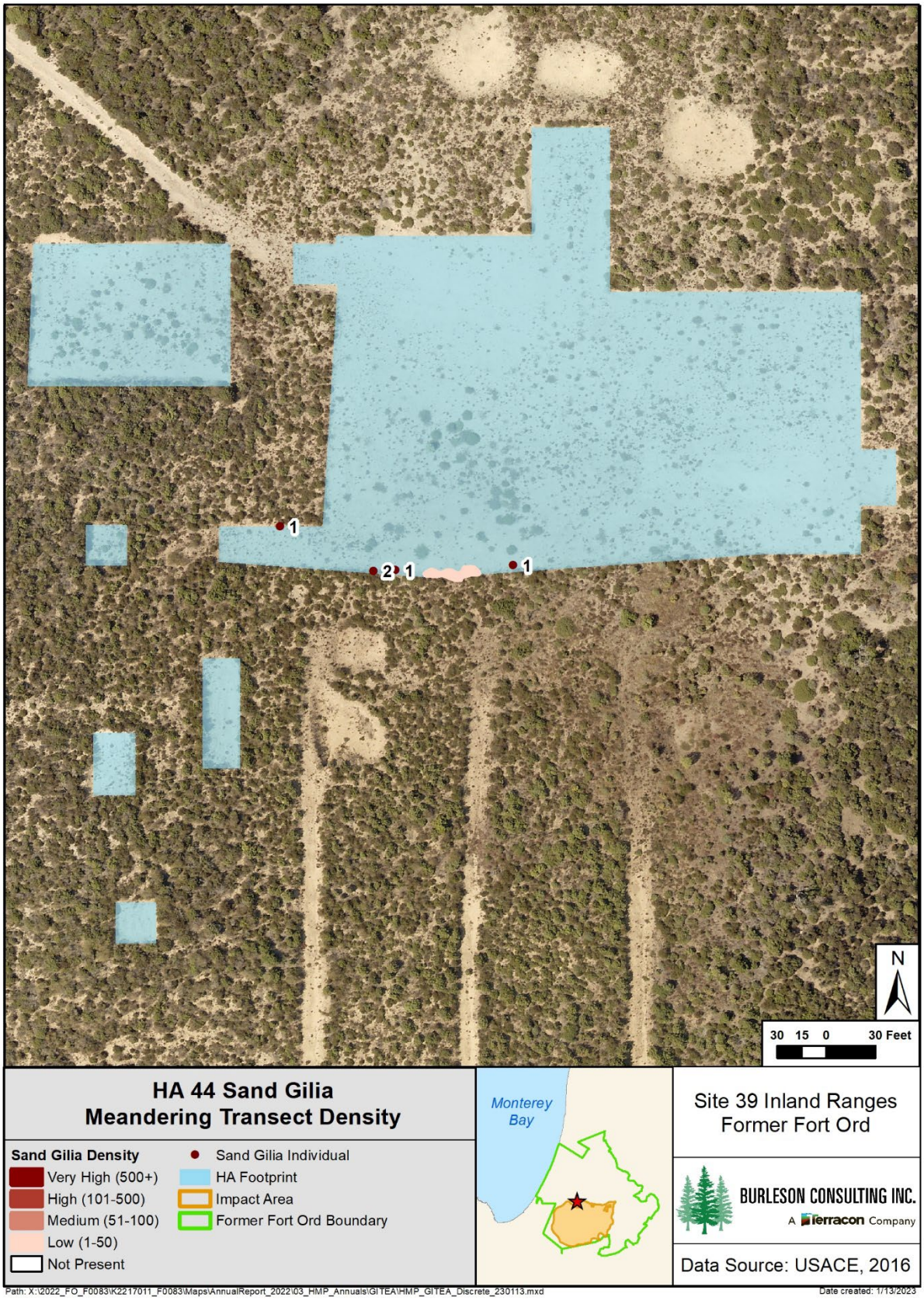


Figure 9-50. HA 44 Sand Gilia Meandering Transect Density Map

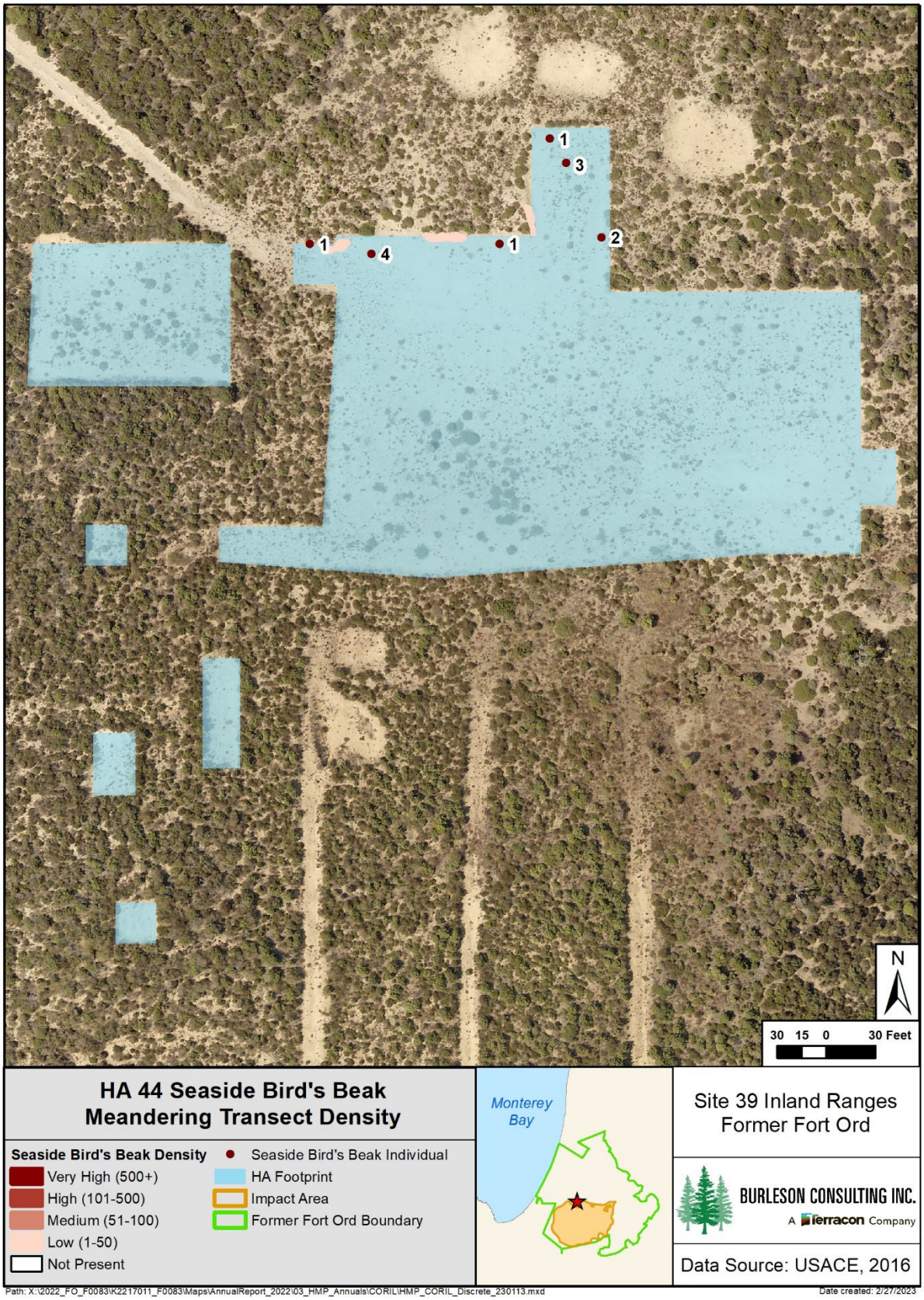


Figure 9-51. HA 44 Seaside Bird's Beak Meandering Transect Density Map

9.17.2.2 Species Richness

Forty-four species were observed at HA 44. Of those, 29 were native shrubs or perennials, 10 were native annual herbaceous species, and five were non-native species (see Table 9-123). Species richness increased by nine species since 2021. Native shrub and perennial species richness increased by four, native herbaceous species richness increased by three, and non-native species richness increased by two. Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of species richness and comparison to the success criteria (see section 6.1.4).

Table 9-123. Species Observed on HA 44, 2022

Scientific Names	Common Names	Code	Category
Achillea millefolium	common yarrow	ACMI	NP
Acmispon glaber	deerweed	ACGL	NP
Acmispon strigosus	Bishop's lotus	ACST	NF
Adenostoma fasciculatum	chamise	ADFA	NP
Aira caryophyllea	silver hair grass	AICA	NNF
*Arctostaphylos pumila**	sandmat manzanita	ARPU	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Baccharis pilularis	coyote brush	BAPI	NP
Carex sp.	sedge	CA	NP
Carpobrotus edulis	hottentot fig	CAED	NNP
Ceanothus dentatus	dwarf ceanothus	CEDE	NP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Chorizanthe diffusa	diffuse spineflower	CHDI	NF
Chorizanthe pungens var. *pungens**	Monterey spineflower	CHPUP	NF
Cordylanthus rigidus ssp. *littoralis**	seaside bird's-beak	CORIL	NF
Corethrogyne filaginifolia	common sandaster	COFI	NP
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Croton californicus	California croton	CRCA	NP
Elymus glaucus	blue wild-rye	ELGL	NP
Ericameria ericoides	mock heather	ERER	NP
*Ericameria fasciculata**	Eastwood's goldenbush	ERFA	NP
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium cicutarium	red-stemmed filaree	ERCI	NNF
Festuca bromoides	brome fescue	FEBR	NNF
Frangula californica	California coffeeberry	FRCA	NP
Gilia tenuiflora ssp. *arenaria**	sand gilia	GITEA	NF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Logfia filaginoides	California cottonrose	LOFI	NF
Logfia gallica	daggerleaf cottonrose	LOGA	NNF
Lomatium parvifolium	coastal biscuitroot	LOPA	NP
Lupinus chamissonis/albifrons	silver bush lupine	LUCH/LUAL	NP
Madia exigua	little tarweed	MAEX	NF
Monardella sinuata ssp. *nigrescens*	curly-leaved monardella	MOSIN	NF
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP	NF
Plantago erecta	California plantain	PLER	NF
Polygala californica	California milkwort	POCA	NP
Pseudognaphalium beneolens	fragrant everlasting	PSBE	NP
Pseudognaphalium californicum	California everlasting	PSCA	NP
Pseudognaphalium ramosissimum	pink everlasting	PSRA	NP

Table 9-123. Species Observed on HA 44, 2022

Scientific Names	Common Names	Code	Category
Pteridium aquilinum var. *pubescens*	western bracken fern	PTAQP	NP
Salvia mellifera	black sage	SAME	NP
Solanum umbelliferum	blue witch	SOUM	NP
Symphoricarpos albus var. *laevigatus*	common snowberry	SYALL	NP
Toxicodendron diversilobum	poison oak	TODI	NP

* HMP species

9.17.2.3 Vegetative Cover

Burleson surveyed two 50-meter line-intercept transects at HA 44. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 40.04%. The mean vegetative cover by native shrubs and perennials was greater in 2022 than 2021 by 4.38%. Table 9-124 summarizes vegetative cover and Table 9-125 presents vegetative cover by species. Figure 9-52 presents the percent cover of dominant species at HA 44 from 2016 to 2022.

Table 9-124. Transect Survey Summary for HA 44

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA44T01	34.66	34.66	0.00	58.80	37.90
HA44T02	45.42	45.42	0.00	60.68	33.12
SITE AVERAGE	**40.04**	**40.04**	**0.00**	**59.74**	**35.51**

Table 9-125. Transect Survey Results for HA 44 by Species

Transect	ACGL (%)	ADFA (%)	ARPU* (%)	ARTO (%)	CATU (%)	CEDE (%)	CERI* (%)	COFI (%)
HA44T01	1.06	2.26	14.38	0.00	0.44	8.94	1.84	0.52
HA44T02	0.00	0.00	23.06	2.86	0.00	15.40	0.88	0.00
SITE AVERAGE	**0.53**	**1.13**	**18.72**	**1.43**	**0.22**	**12.17**	**1.36**	**0.26**

Table 9-125 (continued). Transect Survey Results for HA 44 by Species

Transect	CRSC (%)	ERCO (%)	ERFA* (%)	HOCU (%)	LUCH/LUAL† (%)	TH (%)	BG (%)
HA44T01	0.72	0.00	0.76	3.74	0.00	58.80	37.90
HA44T02	0.20	0.52	0.00	1.88	0.62	60.68	33.12
SITE AVERAGE	**0.46**	**0.26**	**0.38**	**2.81**	**0.31**	**59.74**	**35.51**

* HMP species

† Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of transect data and comparison to the success criteria (see section 6.1.4).

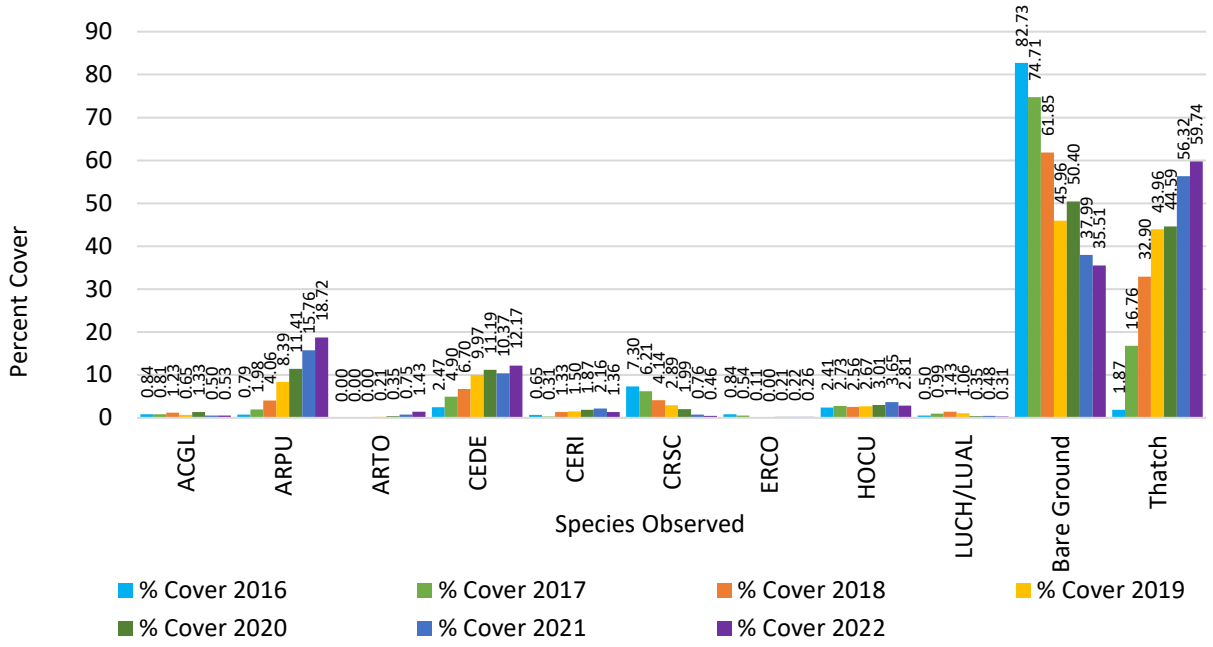


Figure 9-52. Percent Cover of Dominant Species at HA 44 in 2016, 2017, 2018, 2019, 2020 and 2022.

9.17.3 Monitoring Results Discussion

9.17.3.1 HMP Annual Density

No restoration plots were established for HMP annuals at HA 44. However, HMP annuals were mapped as part of the meandering transect survey and all three HMP annuals met or exceeded the density success criterion.

9.17.3.2 Species Richness

Chamise, sandmat manzanita, shaggy-bark manzanita, Monterey ceanothus, and California coffeeberry (*Frangula californica*) were all present. HA 44 included 29 native shrub and perennial species and met the success criterion for Objective 1.

9.17.3.3 Vegetative Cover

Line-intercept transect surveys provide vegetative cover data for multiple objectives outlined in the SSRP. For Objective 1, the data must meet or exceed 40% for native species listed as part of the plant palette. This list includes 14 shrub and perennial species and three annual species presented in Table 2 of the HA 44 SSRP (Burleson, 2013). These species contributed 27.01% cover to the HA, an increase of 2.81% since 2021. This success criterion was not met (see Figure 9-53).

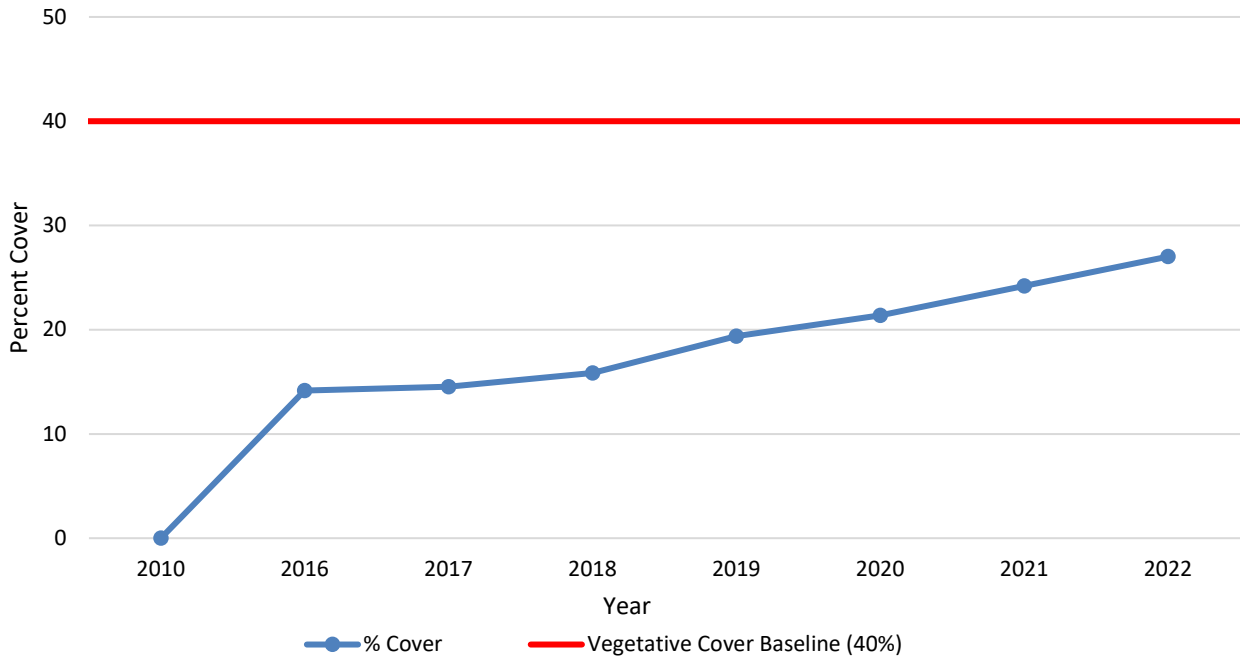


Figure 9-53. Native Vegetative Cover Compared to the Success Criterion at HA 44

Objective 2 considers the percent cover of non-native target weeds. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Objective 3 has multiple success criteria relating to vegetative cover. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 3. Cover class 3 ranges from 6-25% of absolute cover. The HMP shrub species at HA 44 provided an absolute cover of 20.08%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 44, this means a vegetative cover average of at least 2% for sandmat manzanita and Monterey ceanothus must be present. The average vegetative cover for sandmat manzanita was 18.72% and Monterey ceanothus was 1.36% (see Figure 9-54). Both sandmat manzanita and Monterey ceanothus cover were within the acceptable limit; therefore, the success criterion was met.

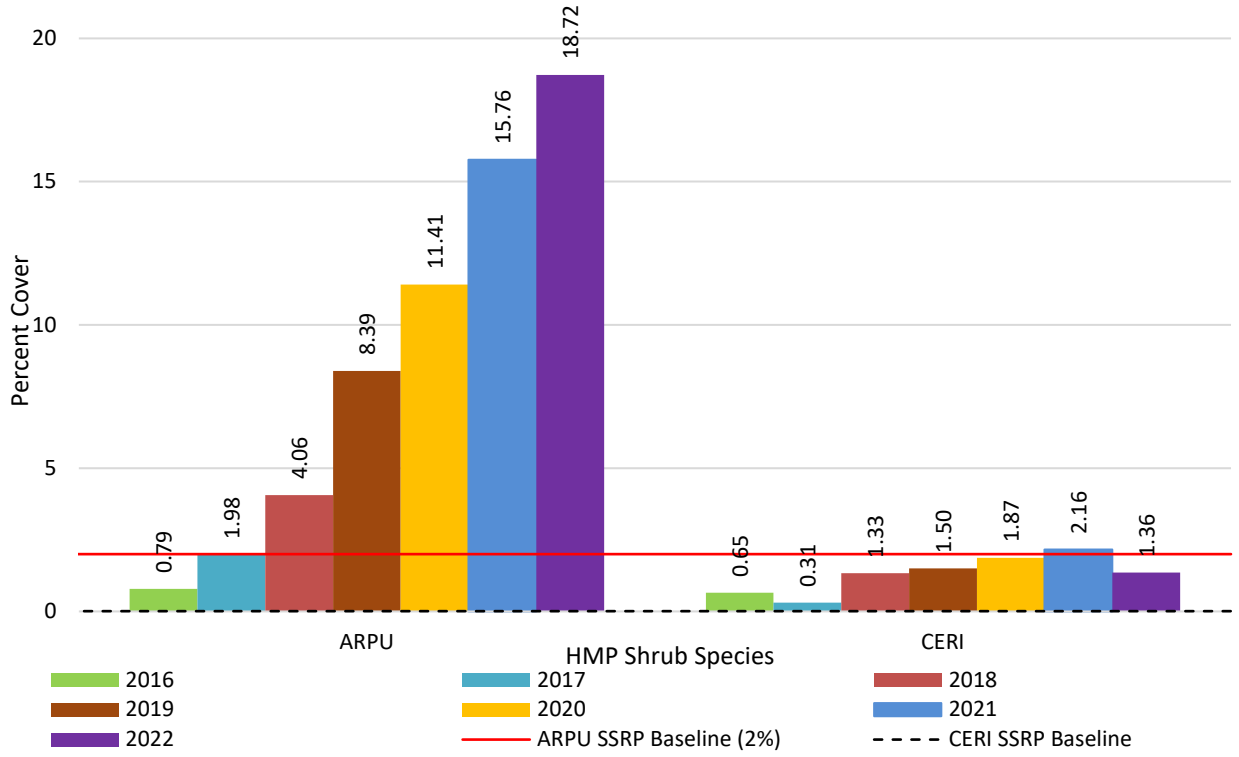


Figure 9-54. HMP Shrub Species Comparison to Success Criteria at HA 44

9.17.4 HA Status Discussion

HA 44 was in year 5 of monitoring in 2022 and met five of six success criteria. The Army does not recommend establishing HMP annual restoration plots since these species are thriving throughout the site. HA 44 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may require additional effort in the future. A qualitative overview was documented by photo points (see Appendix D, page D-18 and Appendix E, page E-1). The site will be reevaluated in 2025 at year 8 of monitoring.

The site will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, vegetative cover line-intercept transects, and plant survivorship in monitoring year 8, 2025 (see Table 9-119). Table 9-126 summarizes the status of HA 44 including which success criteria were met and recommendations.

Table 9-126. Status for Achieving Success Criteria at HA 44

Success Criterion	Category	Acceptable Limits	Year 5 (2022) Met	Recommendation	Notes
Objective 1 – No. 1	Species richness	5 required species: ADFA, ARPU, ARTO, CERI, FRCA	Yes	None	**Year 5**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	None, reassess at year 8	**Year 5**: 27.01%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	None	**Year 5**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Yes	None	**Year 5**: 20.08%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 2% CERI = present	Yes	None	**Year 5**: ARPU 18.72% CERI 1.36%
Objective 3 – No. 4	HMP annual density	Low density for CHPUP, GITEA, and CORIL	Yes	Establishment of restoration plots not necessary	**Year 5**: met

9.18 HA 48

HA 48 was used by the Army as a range for mortars, weapons demonstrations, sniper training, anti-tank weapons, and various other weapons. Approximately 150 cubic yards of soil were excavated over 0.05 acres. HA 48 is within unprotected maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). HA 48 is relatively flat with a southeast aspect and is surrounded by very high-quality habitat.

HA 48 is located on the northern portion of Site 39, within the sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at HA 48 consisted of hand broadcast non-irrigated seed and annual weed management activities. HA 48 has little potential for erosion.

Restoration at HA 48 occurred in 2019 and quantitative monitoring began in 2016. HA 48 was monitored for seven years by photo documentation and site visits, five years for HMP annual density across the HA and species richness, and four years for vegetative cover (see Table 9-127). Monitoring years are counted from a year when at least 50% of SSRP prescription has been applied to a site. Figure 9-55 shows the HA footprint, passive restoration areas, and photo point monitoring locations. Success criteria for HA 48 are summarized in Table 9-128.

Table 9-127. Historic Summary of Restoration and Monitoring Activities at HA 48

Activity	Monitoring Years								
	1	2	3	4	5	6	7	8	13
	2016	2017	2018	2019	2020	2021	2022	2023	2028
Restoration: Active and Passive				●					
Photo Points and Site Visit	●	●	●	●	●	●	●	●	●
HMP Annual Density across HA	●	●	●	●	●			●	
Species Richness	●	●	●	●	●			●	●
Vegetative Cover		●	●	●	●			●	●

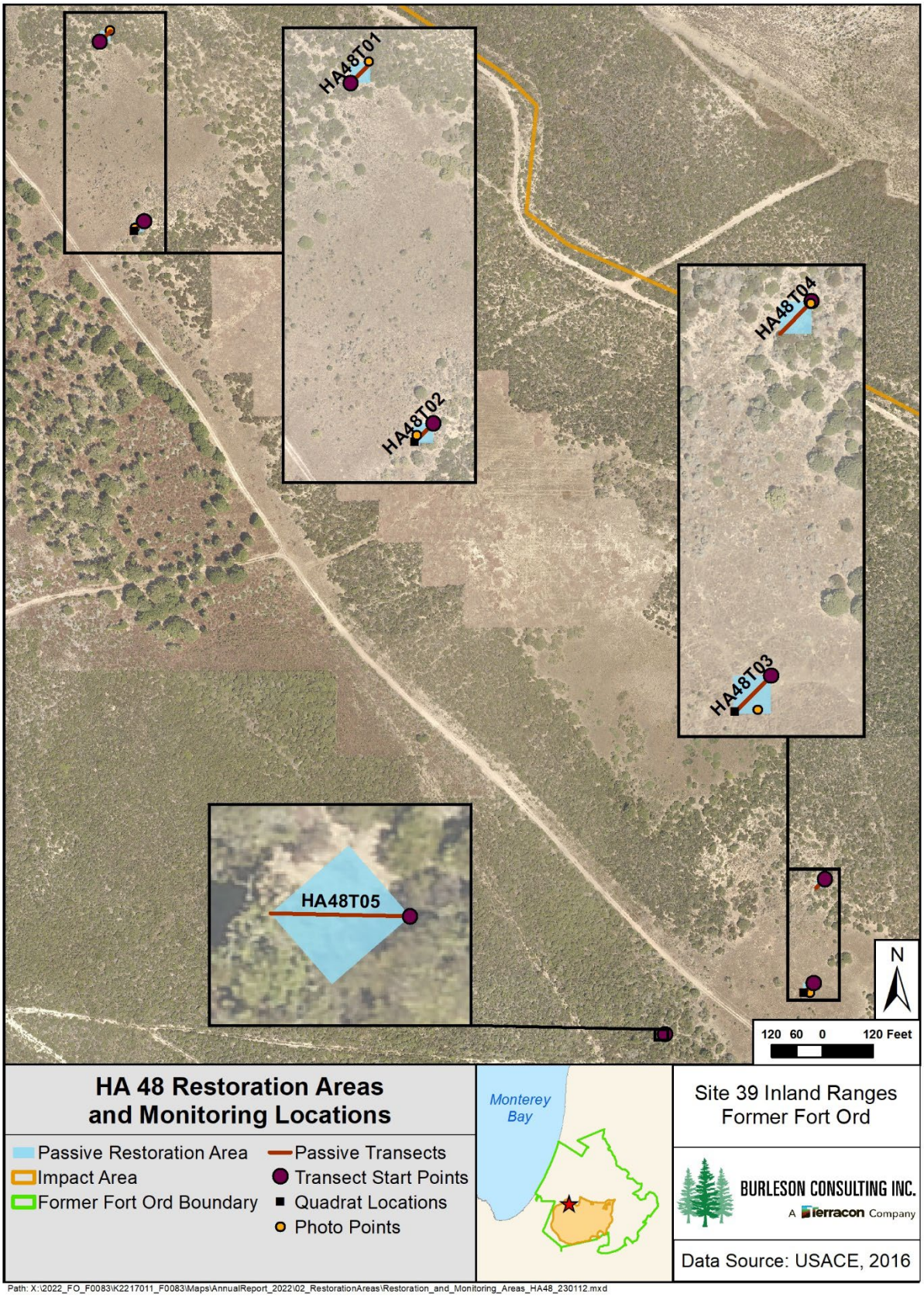


Figure 9-55. HA 48 Restoration Areas and Monitoring Locations Map

Table 9-128. Success Criteria and Acceptable Limits for Restoration of HA 48

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			chamise sandmat manzanita† shaggy-bark manzanita Monterey ceanothus† wedge-leaved horkelia black sage silver bush lupine peak rush-rose
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate presence of non-native target weed species. No more than 5 percent non- native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or less than 1 percent.
			Monterey ceanothus percent cover, as an average of transect data, must be present however, less than 4 percent is acceptable.
	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low Sand gilia density class: Low

* Objectives presented in HRP (Shaw, 2009b)

† HMP Species

9.18.1 Restoration Activities

Burleson performed passive restoration at HA 48 in 2019. The total amount of seed broadcast on site was 1.00 lb compared to 0.87 lb prescribed in the SSRP. SSRP prescription was not fulfilled at this site because it is comprised of small areas that could recover through natural recruitment; however, seed was broadcast for adaptive management in 2019. Table 9-129 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-129. Summary of Passive Restoration Activities for HA 48

Species	Pounds of Seed Broadcast		
	SSRP Target	2019	Total by Species
ACMI	0.10	0.15	0.15
ACGL	0.15	-	-
BAPI	0.03	-	-
CA	0.05	-	-
CERI*	0.05	-	-
CHPUP*	0.01	-	-
CRSC	0.10	-	-
ELGL	-	0.40	0.40
ERER	0.01	-	-
GITEA*	0.01	-	-
HOCU	0.15	0.20	0.20
LUAR	0.08	-	-
LUCH	0.08	-	-
SAME	0.05	-	-
STPU	-	0.25	0.25
TOTAL	**0.87**	**1.00**	**1.00**

* HMP species

No active restoration was prescribed at HA 48; however, an AMP planting event occurred in 2019 per recommendations made in the 2018 Annual Report (Burleson, 2019). A total of 20 plants were installed at HA 48. Table 9-130 summarizes the plants installed during active restoration.

Table 9-130. Summary of Active Restoration Activities for HA 48

Species	Number of Individual Plants	
	2019	Total by Species
ADFA	10	10
ERCO	10	10
TOTAL	**20**	**20**

9.18.2 Monitoring Results

HA 48 was in year 7 of monitoring in 2022. Year 7 does not require quantitative monitoring and only site visits and photo documentation were completed (see Appendix D, page D-19).

9.18.3 HA Status Discussion

HA 48 was in year 7 of monitoring in 2022; the only monitoring that occurred was photo documentation and site visits. Recommendations were developed from a combination of prior recommendations and restoration efforts. The site met five of six success criteria by 2020, year 5 of monitoring. SSRP restoration prescriptions have not been fulfilled at HA 48. Per recommendations in the 2016 Annual Report, chamise was planted in the 2018/2019 season to support the species richness criterion (Burleson, 2017). The Army does not recommend applying the SSRP prescription for HMP annuals at this time since HMP annual densities met the success criteria in 2020. HA 48 needs time to respond to the restoration effort and continued monitoring to evaluate areas that may require additional effort in the future. A qualitative overview was documented by photo points (see Appendix D, page D-19).

HA 48 will continue to be monitored by photo documentation, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 8, 2023. Table 9-131 summarizes the status of HA 48 including which success criteria were met and recommendations.

Table 9-131. Status for Achieving Success Criteria at HA 48

Success Criterion	Category	Acceptable Limits	Year 5 (2020) Met	Recommendation	Notes
Objective 1 – No. 1	Species richness	8 required species: ADFA, ARPU, ARTO, CERI, CRSC, HOCU, LUCH/LUAL, SAME	Yes	None	**Year 5**: met
Objective 1 – No. 2	Native vegetation cover	≥ 40%	No	None, reassess at year 8	**Year 5**: 28.38%
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Yes	None	**Year 5**: 0.00%
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Yes	None	**Year 5**: 20.75%
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 1% CERI = present	Yes	None	**Year 5**: ARPU 20.12% CERI 0.64%
Objective 3 – No. 4	HMP annual density	Low density for CHPUP and GITEA	Yes	None	**Year 5**: met

9.19 Austin Road Stockpile

Austin Road Stockpile encompasses approximately 0.45 acres and was used by the Army as a stockpile for soil remediation and by the Presidio of Monterey Fire Department to provide water to helicopters. The top six inches of soil at the Austin Road Stockpile were removed. The Austin Road Stockpile rests within maritime chaparral with mean annual temperatures ranging between 56° and 58°F and regular fog typical of maritime climates (USFS, 2007). The Austin Road Stockpile is relatively flat. Adjacent lands were not developed and contain intact native vegetation that may promote natural recruitment within restoration areas.

The Austin Road Stockpile is located on the western portion of Site 39, occurring within sand hill formation maritime chaparral containing the Baywood soils series based on previous baseline data (USACE, 1992). Baywood soils consist of very deep, somewhat excessively drained soils on old sand dunes and narrow valleys. Typically, the surface layer is brown, slightly acid loamy sand, 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand, and sand. In a few areas, the surface layer is fine sand (USFS, 2007).

The SSRP prescription for passive restoration at the Austin Road Stockpile consisted of hand broadcast non-irrigated seed and annual weed management activities. Austin Road Stockpile is relatively flat with little potential for erosion.

Restoration activities have not occurred at Austin Road Stockpile. Quantitative monitoring began in 2016. Austin Road Stockpile was monitored for seven years by photo documentation and site visits, HMP annual density across the HA, and species richness (see Table 9-132). Figure 9-56 shows the site footprint, passive restoration area, and photo point monitoring locations. Success criteria for Austin Road Stockpile are summarized in Table 9-133.

Table 9-132. Historic Summary of Monitoring Activities at Austin Road Stockpile

Activity	Monitoring Years							
	2016	2017	2018	2019	2020	2021	2022	2026
Photo Points and Site Visit	●	●	●	●	●	●	●	●
HMP Annual Density across HA	●	●	●	●	●	●	●	●
Species Richness	●	●	●	●	●	●	●	●

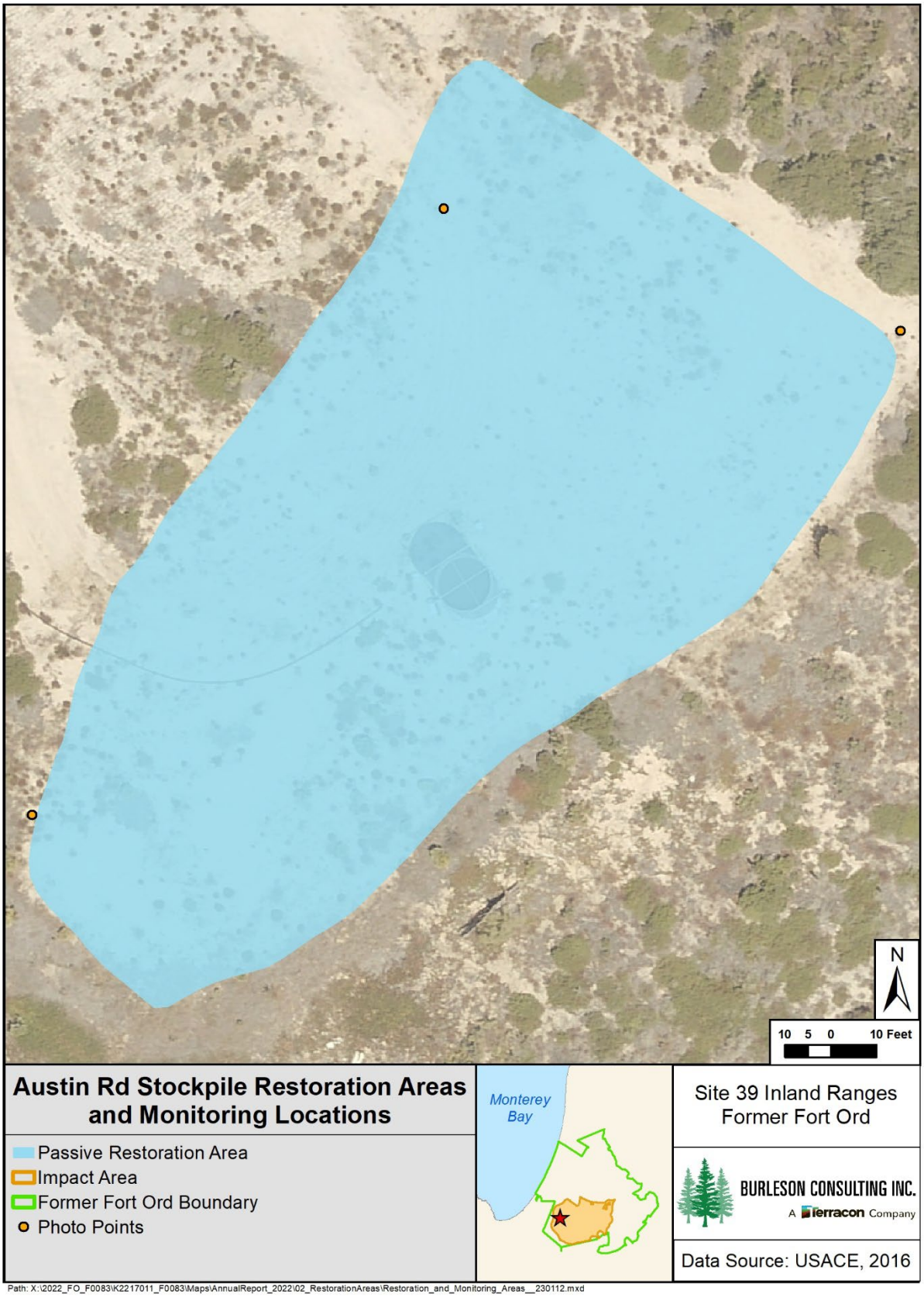


Figure 9-56. Austin Road Stockpile Restoration Areas and Monitoring Locations Map

Table 9-133. Success Criteria and Acceptable Limits for Restoration of Austin Road Stockpile

	Objective 1*		
No.	**Success Element**	**Decision Rule**	**Acceptable Limits**
1	Restoration demonstrates native species richness	Equivalent native species richness equal to baseline data.	Native species that must be present to demonstrate richness:
			common yarrow chamise Hooker's manzanita† shaggy-bark manzanita sandmat manzanita† coyote brush Monterey ceanothus† Monterey spineflower† mock heather golden yarrow peak rush-rose wedge-leaved horkelia deerweed silver bush lupine sticky monkeyflower black sage
2	Percent cover of native species	Percent cover equals 40 percent for native species	For the restoration area, percent cover monitoring data must meet or exceed 40 percent for native species listed as part of the plant palette in Table 2 of the SSRP.
	Objective 2*		
3	Percent cover of non-native target weeds	Percent cover of non-native target weeds must be equal or less than baseline data or equal or less than 5 percent [whichever is lower]	Baseline data did not indicate non-native target weed species. No more than 5 percent non-native target weeds may be present at this restoration site.
	Objective 3*		
4	HMP shrubs percent cover, density, and diversity	HMP shrub cover class must meet or exceed baseline data	Cover class: 3 (6-25% of absolute cover)
		No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Sandmat manzanita percent cover, as an average of transect data, must be equal or greater than 25.
			Monterey ceanothus percent cover, as an average of transect data, must be equal or greater than 4.
			Hooker's manzanita percent cover, as an average of transect data, must be equal or greater than 1.

Table 9-133. Success Criteria and Acceptable Limits for Restoration of Austin Road Stockpile

	Objective 3*		
4	HMP annuals percent cover and abundance [density class]	HMP annuals density class must meet or exceed baseline data	Monterey spineflower density class: Low

* Objectives presented in HRP (Shaw, 2009b)
† HMP Species

9.19.1 Restoration Activities

No passive or active restoration activities occurred at Austin Road Stockpile as of 2022.

9.19.2 Monitoring Results

9.19.2.1 HMP Annual Density

No restoration plots were established for HMP annuals at Austin Road Stockpile. However, HMP annuals were mapped as a part of the meandering transect survey. This survey was completed for Monterey spineflower and sand gilia at Austin Road Stockpile.

Three individual plants and two discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-57). Densities were low to medium and the total acreage of Monterey spineflower patches with a density at or above the SSRP baseline density class of low was 0.063 acres. From 2021 to 2022, the density range above the SSRP baseline increased and while acreage decreased.

Sand gilia was not observed at Austin Road Stockpile in 2022 which is consistent with 2021. However, sand gilia was observed previously on site in 2017.

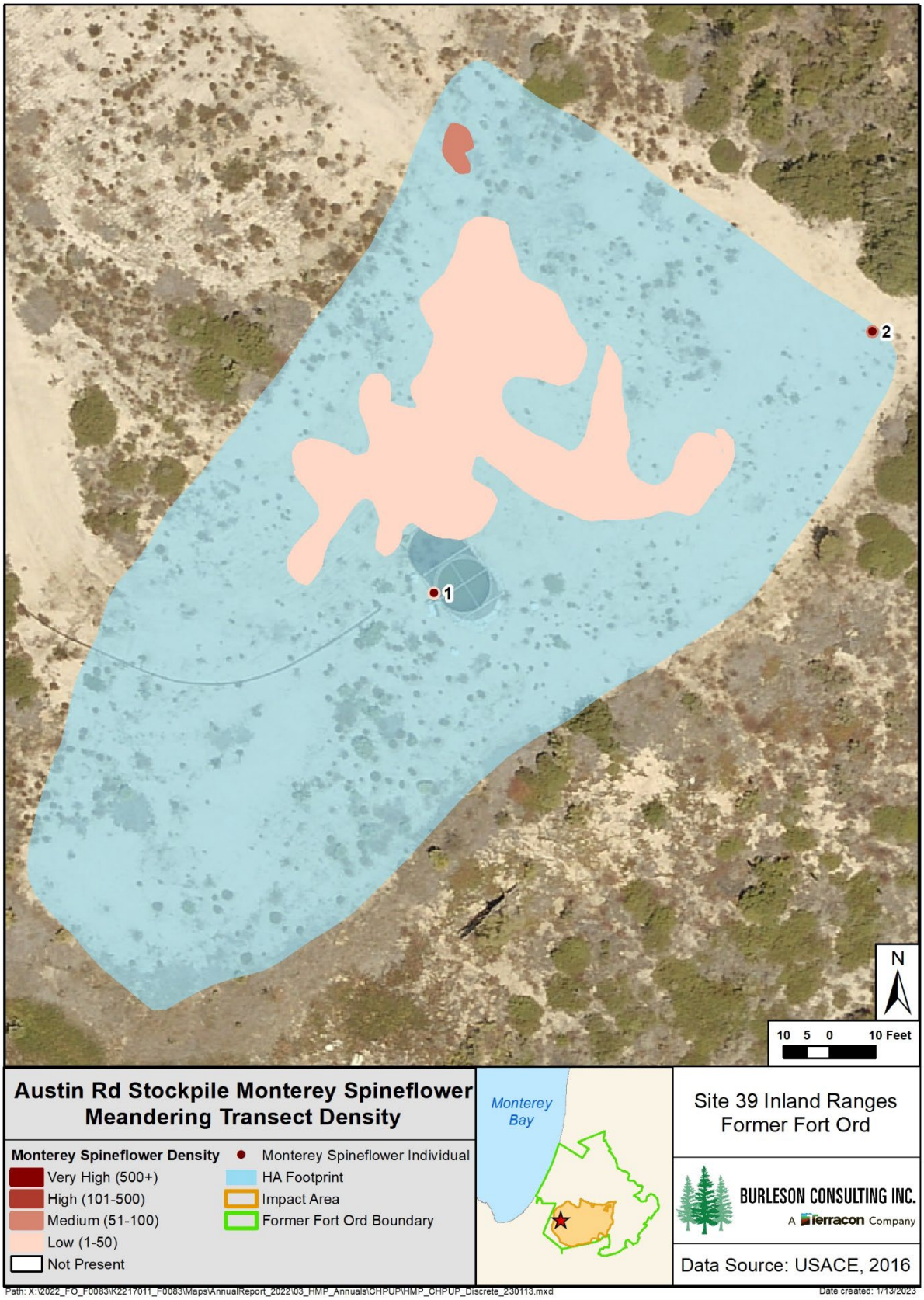


Figure 9-57. Austin Road Stockpile Monterey Spineflower Meandering Transect Density Map

9.19.2.2 Plant Survivorship

No active restoration was prescribed; therefore, no survivorship data were collected.

9.19.2.3 Species Richness

Forty-five species were observed at Austin Road Stockpile. Of those, 20 were native shrubs or perennials, nine were native annual herbaceous species, and 16 were non-native species (see Table 9-134). Species richness increased by three species since 2021. Native shrub and perennial species richness decreased by two, native herbaceous species richness increased by two, non-native species richness increased by four, and uncategorized species richness decreased by one. Due to subtle phenological differences between *Lupinus albifrons* var. *albifrons* and *Lupinus chamissonis* and the timing of surveys, the two species were combined for analysis of species richness and comparison to the success criteria (see section 6.1.4).

Table 9-134. Species Observed at Austin Road Stockpile, 2022

Scientific Name	Common Name	Code	Category
Acmispon glaber	deerweed	ACGL	NP
Acmispon heermannii var. *orbicularis*	Heermann's lotus	ACHEO	NP
Acmispon strigosus	Bishop's lotus	ACST	NF
*Arctostaphylos pumila**	sandmat manzanita	ARPU	NP
Arctostaphylos tomentosa	shaggy-bark manzanita	ARTO	NP
Avena barbata	slender wild oat	AVBA	NNF
Baccharis pilularis	coyote brush	BAPI	NP
Briza maxima	rattlesnake grass	BRMA	NNF
Bromus madritensis ssp. *rubens*	foxtail chess	BRMAR	NNF
Cardionema ramosissimum	sand mat	CARA	NP
Carex sp.	sedge	CA	NP
Carpobrotus edulis	hottentot fig	CAED	NNP
Ceanothus dentatus	dwarf ceanothus	CEDE	NP
*Ceanothus rigidus**	Monterey ceanothus	CERI	NP
Centaurea melitensis	tocalote	CEME	NNF
Chorizanthe diffusa	diffuse spineflower	CHDI	NF
Chorizanthe pungens var. *pungens**	Monterey spineflower	CHPUP	NF
Corethrogyne filaginifolia	common sandaster	COFI	NP
Crocanthemum scoparium	peak rush-rose	CRSC	NP
Daucus pusillus	wild carrot	DAPU	NF
Diplacus aurantiacus	sticky monkeyflower	DIAU	NP
Dudleya farinosa	bluff lettuce	DUFA	NP
Ericameria ericoides	mock heather	ERER	NP
Erigeron canadensis	horseweed	ERCA	NF
Eriophyllum confertiflorum	golden yarrow	ERCO	NP
Erodium botrys	long-beaked filaree	ERBO	NNF
Erodium cicutarium	red-stemmed filaree	ERCI	NNF
Festuca myuros	rattail sixweeks grass	FEMY	NNF
Gamochaeta ustulata	purple cudweed	GAUS	NP
Heterotheca grandiflora	telegraph weed	HEGR	NF
Horkelia cuneata	wedge-leaved horkelia	HOCU	NP
Hypochaeris glabra	smooth cat's ear	HYGL	NNF
Hypochaeris radicata	rough cat's ear	HYRA	NNP
Logfia gallica	daggerleaf cottonrose	LOGA	NNF
Lupinus chamissonis/albifrons	silver bush lupine	LUCH/LUAL	NP

Table 9-134. Species Observed at Austin Road Stockpile, 2022

Scientific Name	Common Name	Code	Category
Lupinus truncatus	Nuttall's annual lupine	LUTR	NF
Lysimachia arvensis	scarlet pimpernel	LYAR	NNF
Navarretia hamata ssp. *parviloba*	hooked navarretia	NAHAP	NF
Orobanche californica ssp. *californica*	broomrape	ORCAC	NP
Plantago erecta	California plantain	PLER	NF
Polycarpon tetraphyllum var. *tetraphyllum*	four-leaved allseed	POTET	NNF
Rumex acetosella	sheep sorrel	RUAC	NNP
Salvia mellifera	black sage	SAME	NP
Silene gallica	small-flower catchfly	SIGA	NNF
Spergula arvensis	corn spurry	SPAR	NNF

* HMP species

9.19.2.4 Vegetative Cover

No transect or quadrat surveys were completed at Austin Road Stockpile.

9.19.3 Monitoring Results Discussion

9.19.3.1 HMP Annual Density

No restoration plots were established for HMP annuals at Austin Road Stockpile. However, HMP annuals were mapped as a part of the meandering transect survey. Monterey spineflower met the density success criterion.

9.19.3.2 Plant Survivorship

No active restoration was prescribed; therefore, no survivorship data were collected.

9.19.3.3 Species Richness

Deerweed, sandmat manzanita, shaggy-bark manzanita, coyote brush, Monterey ceanothus, Monterey spineflower, peak rush-rose (*Crocanthemum scoparium*), sticky monkeyflower, golden yarrow, mock heather, wedge-leaved horkelia, silver bush lupine, and black sage were present. Common yarrow, chamise, and Hooker's manzanita were not present. Austin Road Stockpile included 20 native shrub and perennial species; however, the site did not meet the success criterion for Objective 1.

9.19.3.4 Vegetative Cover

No transect or quadrat surveys were completed at Austin Road Stockpile.

9.19.4 HA Status Discussion

Austin Road Stockpile did not receive any SSRP prescription activities by 2022. The site is used by the Presidio of Monterey Fire Department to supply water to helicopters for the Army's Fort Ord Prescribed Burn Program and will not be restored until those activities are complete. A qualitative overview was documented by photo points (see Appendix D, page D-20). Restoration activities will occur in the future at the site.

Austin Road Stockpile will be monitored in 2023 by photo documentation, HMP annual density surveys, and species richness meandering transects. Table 9-135 summarizes the status of Austin Road Stockpile including which success criteria were met and recommendations.

Table 9-135. Status for Achieving Success Criteria at Austin Rd Stockpile

Success Criterion	Category	Acceptable Limits	Met	Recommendation	Notes
Objective 1 – No. 1	Species richness	16 required species: ACGL, ACMI, ADFA, ARHO, ARTO, ARPU, BAPI, CERI, CHPUP, DIAU, ERER, ERCO, CRSC, HOCU, LUCH/LUAL, SAME	No	Wait for restoration to begin	ACMI, ADFA, and ARHO absent in 2022
Objective 1 – No. 2	Native vegetation cover	≥ 40%	Cannot assess	Install transects when appropriate	
Objective 2 – No. 3	Non-native target weed cover	≤ 5%	Cannot assess	Install transects when appropriate	
Objective 3 – No. 4	HMP shrub cover	Cover class 3: 6-25%	Cannot assess	Install transects when appropriate	
Objective 3 – No. 4	HMP shrub cover by species	ARPU ≥ 25% CERI ≥ 4% ARHO ≥ 1%	Cannot assess	Install transects when appropriate	
Objective 3 – No. 4	HMP annual density	Low density for CHPUP	Yes	Establishment of restoration plots not necessary	

9.20 Summary of Former Fort Ord Inland Ranges Site 39

HAs are in the final stages of restoration and at various stages of monitoring. Passive and/or active restoration was implemented in all but Austin Road Stockpile. Restoration is complete at HAs 18, 19, 22, 23, 27, 27A, 28, 29, 33, 34, 36, 38, 39/40, 43, 44, and 48. Based on when the restoration effort took place, HAs range from year 5 to year 10 for monitoring. According to the HRP, at the fifth year, each site undergoes a five-year review to determine whether substantial corrective measures should be undertaken to put the site on target for success at year 13 (Shaw, 2009b). HA 44 is in year 5 of monitoring in 2022 and requires no corrective measures. The Army recommends corrective measures for HAs 39/40 repeated from past reports. Corrective measures are outlined in the HA status discussion subsection for each HA. Additionally, the HRP states HMP annual monitoring is complete after year 8 and a data review is needed to determine whether the sites have met the success criterion (Shaw, 2009b). HMP annual monitoring is in year 8 at HAs 28, 37, and 38. All sites met or exceeded baseline density requirements. HA 34 is in year 8 but there are no HMP annual density requirements.

Overall, none of the 19 restoration sites met the complete success criteria. HA 27A is now evaluated by the northern and southern polygons but is not considered two separate sites. Of the 20 areas evaluated by success criteria, 18 met the species richness criterion, five met the native vegetation cover criterion, 19 met the non-native target weed cover criterion, nine met the HMP shrub cover class criterion, and three met the HMP shrub cover by species criterion. Of the 14 sites that have HMP annual criteria, 13 sites met the HMP annual density criterion. Table 9-136 summarizes the status of Site 39 in meeting the success criteria.

The Army recommends the following changes to SSRPs, monitoring, and the success criteria:

- HA 33 – broadcast production seed (existing inventory) in barren areas to address the native vegetation cover criterion.
- HA 36 – broadcast production seed (existing inventory) in barren areas to address the native vegetation cover criterion.
- HA 39/40 – install an additional transect in Plot 3 to better assess restoration progress, broadcast production seed to address native vegetative cover criterion.
- HA 43 – broadcast production seed (existing inventory) in barren areas to address the native vegetation cover criterion. Sand gilia did not meet medium density class criterion after corrective measures, no further sand gilia seeding is recommended. It is currently meeting low density class.

Table 9-136. 2022 Status for Achieving Success Criteria at Historic Areas in Former Fort Ord Inland Ranges Site 39

HA	Monitoring Year (2022)	Success Criteria					
		Species Richness	Native Vegetation Cover	Non-native Target Weed Cover	HMP Shrub Cover Class	HMP Shrub Cover by Species	HMP Annual Density
18	10	No	Yes	Yes	Yes	No	Yes
19	9	Yes	No	Yes	Yes	Yes	Yes
22	10	Yes	Yes	Yes	No	No	Yes
23	10	Yes	No	Yes	Yes	No	Yes
26	7	Yes	No	Yes	No	No	Yes
27	10	Yes	No	Yes	No	No	NA
27A North	10	Yes	No	Yes	No	No	NA
27A South	10	Yes	NA	Yes	NA	NA	NA
28	8	Yes	Yes	Yes	Yes	No	Yes
29	10	Yes	No	Yes	No	No	NA
33	10	Yes	No	Yes	No	No	Yes
34	8	Yes	Yes	Yes	No	No	NA
36	10	Yes	No	Yes	No	No	NA
37	8	Yes	No	Yes	Yes	No	Yes
38	8	Yes	Yes	Yes	Yes	No	Yes
39/40	10	Yes	No	Yes	NA	NA	Yes
43	10	Yes	No	Yes	Yes	No	No
44	5	Yes	No	Yes	Yes	Yes	Yes
48	7	Yes	No	Yes	Yes	Yes	Yes
Austin Rd Stockpile	0	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes

HAs in years 1-5, 8, and 13 are in monitoring years and the status of each success criterion is based on current data. For sites not in these monitoring years, the status of each success criterion may be from past monitoring years.
* HAs where transect monitoring has not been completed cannot be compared to the success criterion. Transect monitoring will be performed in the future.
NA - the success criterion does not apply.

For HAs in year 8 of monitoring or beyond, the likelihood for meeting success criteria by year 13 was projected based on the trajectory of monitoring data collected at years 5 and 8 compared to success

criteria (Table 9-137). Implications for low, moderate, and high likelihood projections are described below.

- Low: There is a low likelihood that the success criterion will be met by year 13. The site may or may not be trending toward meeting the success criterion and is unlikely to meet it by year 13 at the current trajectory. It is also not likely that the success criterion will be met within five years of year 13 at the current trajectory.
- Moderate: There is a moderate likelihood that the success criterion will be met by year 13. The site is trending toward meeting the success criterion and is very likely to meet it within five years of year 13.
- High: There is a high likelihood that the success criterion will be met by year 13. The site is trending toward meeting the success criterion and is highly likely to meet it by year 13.

Table 9-137. Projected Likelihood for Achieving Success Criteria by Year 13 at Historic Areas in Former Fort Ord Inland Ranges Site 39

HA	Current Monitoring Year (2022)	Monitoring Year 13	Success Criteria					
			Species Richness	Native Vegetation Cover	Non-native Target Weed Cover	HMP Shrub Cover Class	HMP Shrub Cover by Species	HMP Annual Density
18	10	2025	HIGH	HIGH	HIGH	HIGH	HIGH	met
19	9	2026	HIGH	HIGH	HIGH	HIGH	HIGH	met
22	10	2025	HIGH	HIGH	HIGH	MODERATE	LOW	met
23	10	2025	HIGH	HIGH	HIGH	HIGH	LOW	met
26	7	2028	NA	NA	NA	NA	NA	NA
27	10	2025	HIGH	HIGH	HIGH	LOW	LOW	NA
27A North	10	2025	HIGH	HIGH	HIGH	LOW	LOW	NA
27A South	10	2025	HIGH	NA	HIGH	NA	NA	NA
28	8	2027	HIGH	HIGH	HIGH	HIGH	LOW	met
29	10	2025	HIGH	HIGH	HIGH	LOW	LOW	NA
33	10	2025	HIGH	MODERATE	HIGH	LOW	LOW	met
34	8	2027	HIGH	HIGH	HIGH	LOW	LOW	NA
36	10	2025	HIGH	LOW	HIGH	MODERATE	LOW	NA
37	8	2027	HIGH	HIGH	HIGH	HIGH	MODERATE	met
38	8	2027	HIGH	HIGH	HIGH	HIGH	LOW	met**
39/40	10	2025	HIGH	LOW	HIGH	NA	NA	met
43	10	2025	HIGH	MODERATE	HIGH	HIGH	LOW	not met
44	5	2030	NA	NA	NA	NA	NA	NA
48	7	2028	NA	NA	NA	NA	NA	NA
Austin Rd Stockpile	0	NA	NA	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	NA

HAs in years 1-5, 8, and 13 are in monitoring years and the status of each success criterion is based on current data. For sites not in these monitoring years, the status of each success criterion may be from past monitoring years.

* HAs where transect monitoring has not been completed cannot be compared to the success criterion. Transect monitoring will be performed in the future.

** HA 38 met criterion for CHPUP and GITEA at year 8. CORIL plot established in 2020/2021, will be monitored until 2028.

NA - the success criterion does not apply.

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10. COMMUNITY INVOLVEMENT WORKSHOP / OPEN HOUSE BUS TOUR

In addition to general restoration activities, Burleson developed a PowerPoint presentation highlighting the restoration progress at various HAs over time for the virtual former Fort Ord Clean-Up Open House held on February 12, 2022. Burleson was scheduled to participate in the former Fort Ord Clean-Up Open House at the Kemron Building and the Bus Tour of Site 39 Inland Range in July 2022. Due to COVID-19, the event was cancelled.

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11. ANNUAL SITE 39 HABITAT RESTORATION MEETING

In accordance with the HRP, annual meetings were held with regulatory agencies and USACE to review and discuss restoration site data, restoration activities, annual monitoring results, and proposed adaptive management strategies for improving restoration success. These meetings also evaluated weed management, sampling protocols, passive versus active restoration approaches, the need to implement corrective measures, and assessment of the 13-year monitoring end point proposed in the HRP.

The Eleventh Annual Site 39 Habitat Restoration and Habitat Monitoring Meeting was held remotely on April 7, 2022 due to the COVID-19 pandemic. Participants included Chenega Support Services, USFWS, California Department of Fish and Wildlife, US Environmental Protection Agency, USACE, BRAC, Bureau of Land Management, Burleson, and UC Santa Cruz Natural Reserves.

Burleson presented details on Site 39 habitat restoration activities for the 2021 calendar year and the overall status of restoration progress.

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APPENDIX A

Seed and Plant Tables

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Table A-1. Site Specific Restoration Plan Seed Collection Targets and Inventory

Scientific Name	Common Name	HA	Target Amount (lb)	Collected Amount (lb)
Artemisia californica	California sagebrush	34	0.80	0.80
Baccharis pilularis	coyote brush	34	0.16	0.16
*Ceanothus rigidus**	Monterey ceanothus	34	0.80	0.80
Crocanthemum scoparium	peak rush-rose	34	0.80	0.80
Diplacus aurantiacus	sticky monkey flower	34	0.08	0.08
Eriophyllum confertiflorum	golden yarrow	34	0.24	0.24
Horkelia cuneata	wedge-leaved horkelia	34	1.60	1.60
Lupinus arboreus	yellow bush lupine	34	0.80	0.80
Salvia mellifera	black sage	34	0.80	0.80
TOTAL			**6.08**	**6.08**

* HMP species

Table A-2. Production Seed Targets and Inventory

Scientific Name	Common Name	HA	Target Amount (lb)	Inventory (lb)*
Achillea millefolium	common yarrow	-	1.60	22.40
Acmispon glaber	deerweed	-	2.40	44.05
Elymus glaucus	blue wildrye	-	7.20	444.80
Hordeum sp.	sterile barley	-	8.00	18.75
Stipa pulchra	purple needlegrass	-	3.20	424.60
TOTAL			**22.40**	**954.60**

* Inventory was taken after seed broadcast occurred

Table A-3. Production Seed Test Results

Scientific Name	Common Name	Test Date	Pure Seed (%)	Germination (%)	Pure Live Seed (%)	Live Seeds per lb
Stipa pulchra	purple needlegrass	9/16/2022	95.35	85.00	81.05	86,347

Table A-4. Plant Propagation Inventory

Scientific Name	Common Name	HA 34 (# individuals)
Achillea millefolium	common yarrow	10
Acmispon glaber	deerweed	40
Adenostoma fasciculata†	chamise	156
*Arctostaphylos hookeri**†	Hooker's manzanita	114
*Arctostaphylos montereyensis**†	Monterey manzanita	89
Arctostaphylos tomentosa ssp. *tomentosa*†	shaggy-bark manzanita	66
Artemisia californica	California sagebrush	70
Baccharis pilularis	coyote brush	60
*Ceanothus rigidus**	Monterey ceanothus	119
Crocanthemum scoparium	peak rush-rose	213
Diplacus aurantiacus	sticky monkey flower	118
Eriophyllum confertiflorum	golden yarrow	104
Horkelia cuneata	wedge-leaved horkelia	189
Lupinus arboreus	yellow bush lupine	65
Salvia mellifera	black sage	193
TOTAL		**1,606**

* HMP species
† Species propagated via cuttings

Table A-5. Adaptive Management Plan Plant Propagation Inventory

Species	Common Name	HA 18 (# indiv)	HA 22 (# indiv)	HA 23 (# indiv)	HA 27 (# indiv)	HA 36 (# indiv)
*Arctostaphylos pumila**†	sandmat manzanita	-	20	-	20	-
*Arctostaphylos montereyensis**†	Monterey manzanita	-	-	-	-	59
*Ceanothus rigidus**	Monterey ceanothus	100	20	20	-	60
*Ericameria fasciculata**	Eastwood's goldenbush	-	40	40	-	-
TOTAL		**100**	**80**	**60**	**20**	**119**

* HMP species
† Species propagated via cuttings

APPENDIX B

Restoration Activities

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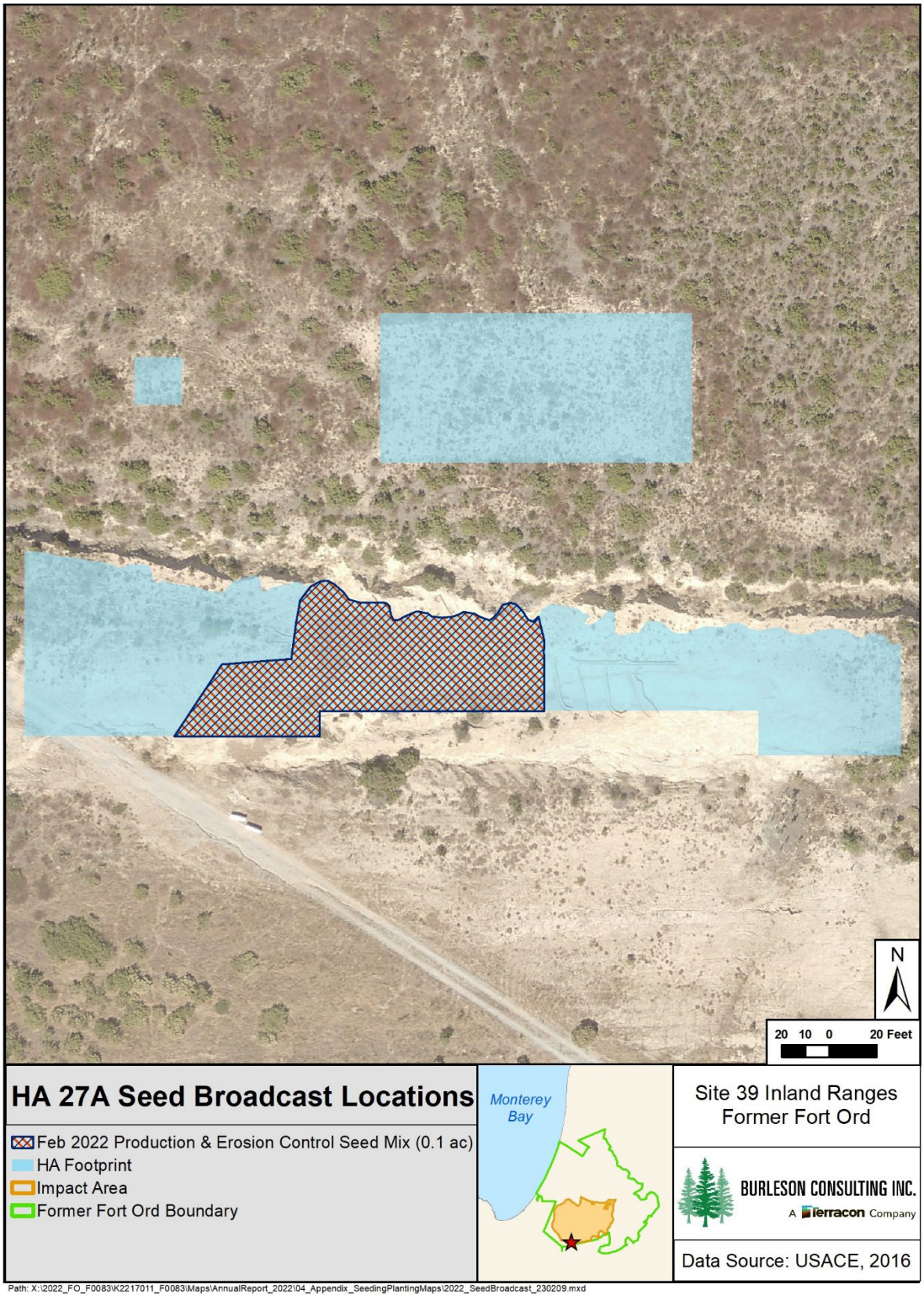

Figure B-1. HA 27A Seed Broadcast Locations, Former Fort Ord

Table B-1. HA 27A Erosion Control Seed Mix (Feb 2022)

Species	Amount (lb)
Elymus glaucus **(blue wild-rye)**	0.8
Hordeum sp. **(sterile barley)**	1.2
Stipa pulchra **(purple needlegrass)**	0.1
TOTAL	**2.1**

Table B-2. HA 27A Production Seed Mix (Feb 2022)

Species	Amount (lb)
Achillea millefolium **(common yarrow)**	0.2
Acmispon glaber **(deerweed)**	0.4
Elymus glaucus **(blue wild-rye)**	0.5
Stipa pulchra **(purple needlegrass)**	0.5
TOTAL	**1.6**

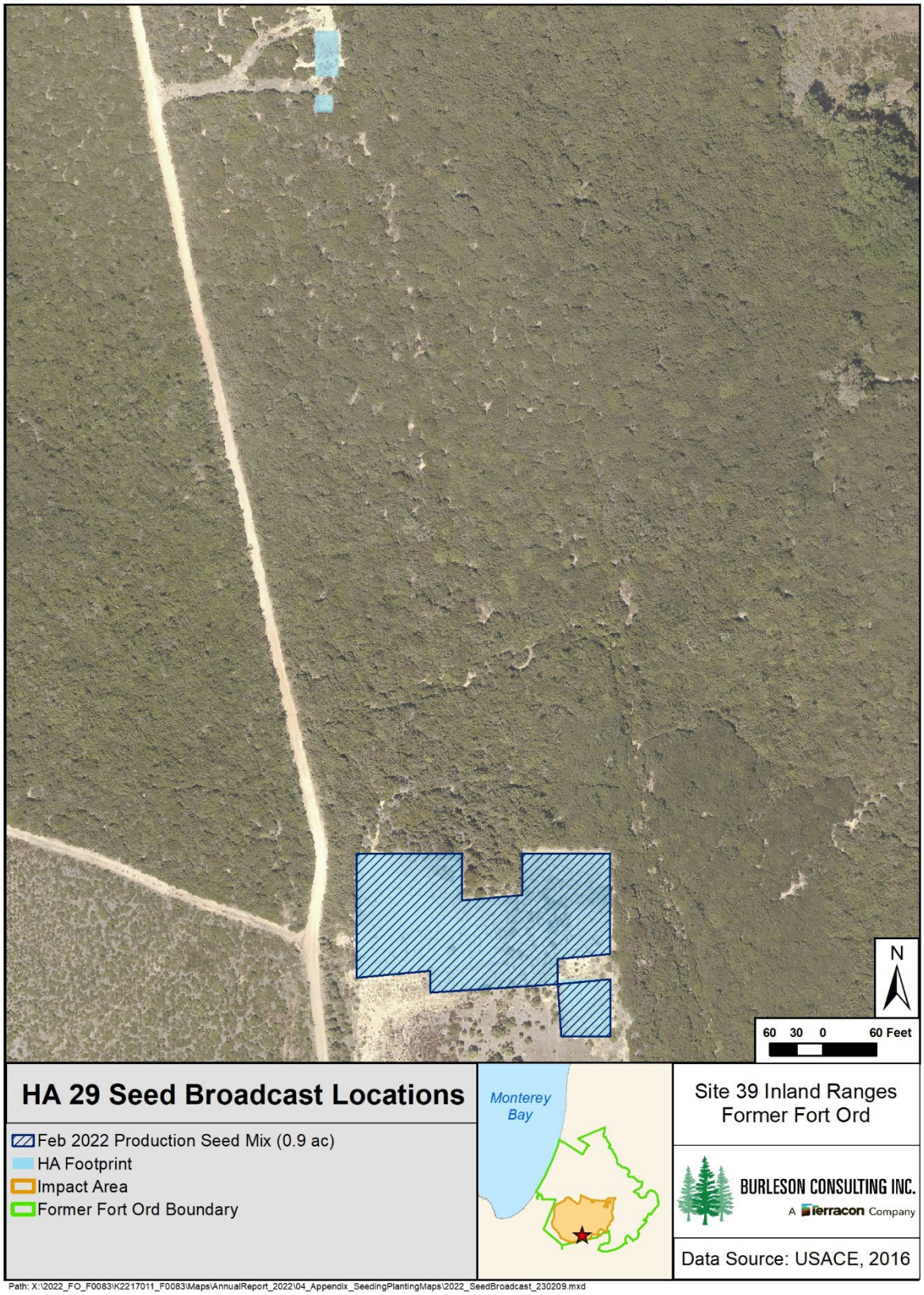

Figure B-2. HA 29 Seed Broadcast Locations, Former Fort Ord

Table B-3. HA 29 Production Seed Mix (Feb 2022)

Species	Amount (lb)
Achillea millefolium **(common yarrow)**	2.0
Acmispon glaber **(deerweed)**	4.0
Elymus glaucus **(blue wild-rye)**	5.0
Stipa pulchra **(purple needlegrass)**	5.0
TOTAL	**16.0**

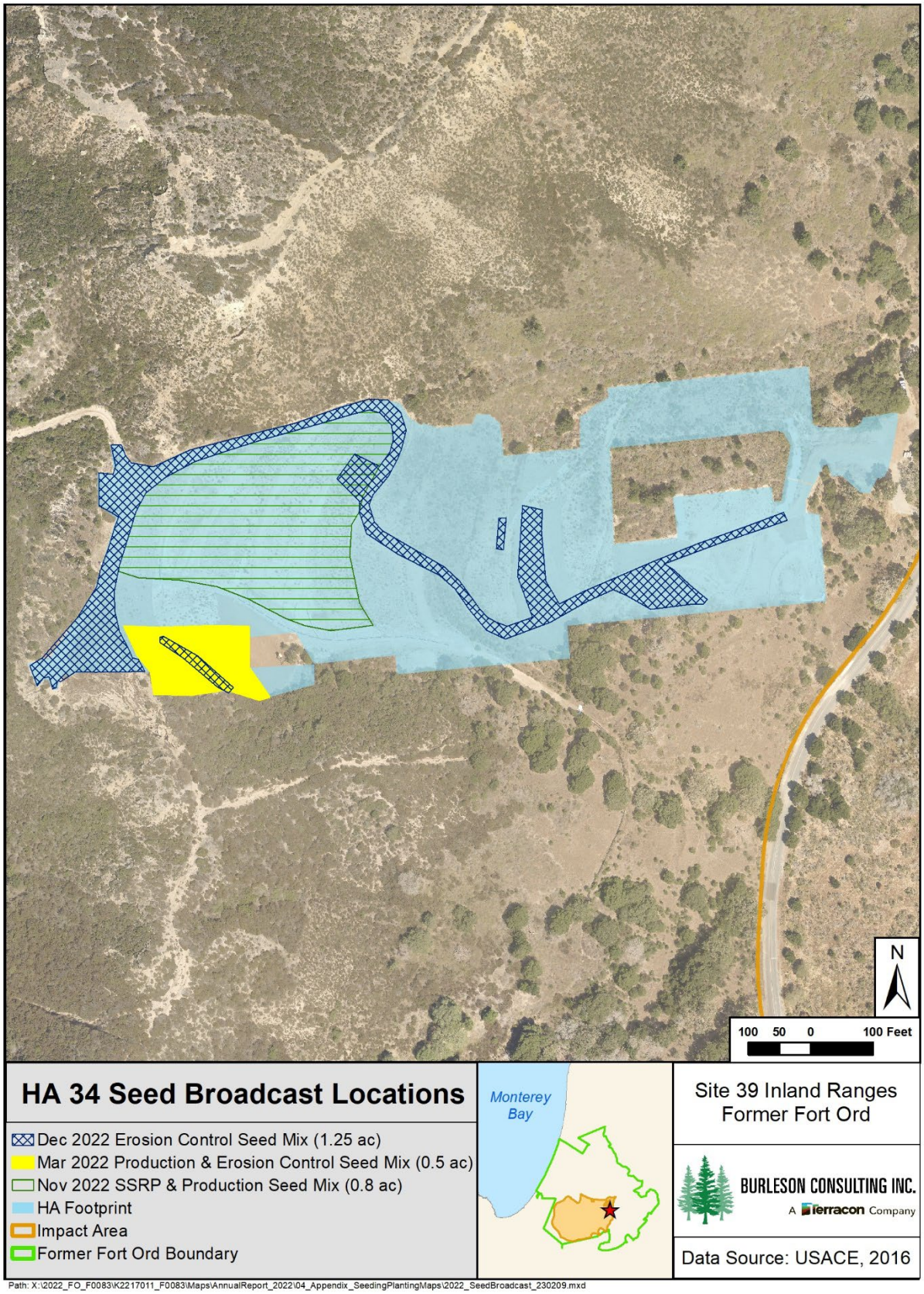

Figure B-3. HA 34 Seed Broadcast Locations, Former Fort Ord

Table B-4. HA 34 Erosion Control Seed Mix (Mar 2022)

Species	Amount (lb)
Elymus glaucus **(blue wild-rye)**	8.0
Hordeum sp. **(sterile barley)**	12.0
Stipa pulchra **(purple needlegrass)**	1.0
TOTAL	**21.0**

Table B-5. HA 34 Production Seed Mix (Mar 2022)

Species	Amount (lb)
Achillea millefolium **(common yarrow)**	2.0
Acmispon glaber **(deerweed)**	4.0
Elymus glaucus **(blue wild-rye)**	5.0
Stipa pulchra **(purple needlegrass)**	5.0
TOTAL	**16.0**

Table B-6. HA 34 SSRP Seed Mix Enhanced with Production Seed (Nov 2022)

Species	Amount (lb)
Achillea millefolium† **(common yarrow)**	1.60
Acmispon glaber† **(deerweed)**	2.40
Artemisia californica (**California sagebrush)**	0.80
Baccharis pilularis **(coyote brush)**	0.16
*Ceanothus rigidus** **(Monterey ceanothus)**	0.80
Crocanthemum scoparium **(rush-rose)**	0.80
Diplacus aurantiacus **(sticky monkey-flower)**	0.08
Elymus glaucus† **(blue wild-rye)**	7.20
Eriophyllum confertiflorum **(golden yarrow)**	0.24
Hordeum sp. † **(sterile barley)**	8.00
Horkelia cuneata **(wedge-leaved horkelia)**	1.60
Lupinus arboreus **(yellow bush lupine)**	0.80
Salvia mellifera **(black sage)**	0.80
Stipa pulchra† **(purple needlegrass)**	3.20
TOTAL	**28.48**

*HMP species
†production seed

Table B-7. HA 34 Erosion Control Seed Mix (Dec 2022)

Species	Amount (lb)
Achillea millefolium **(common yarrow)**	5.00
Acmispon glaber **(deerweed)**	6.25
Elymus glaucus **(blue wild-rye)**	12.50
Hordeum sp. (**sterile barley)**	6.25
Stipa pulchra **(purple needlegrass)**	12.50
TOTAL	**42.50**

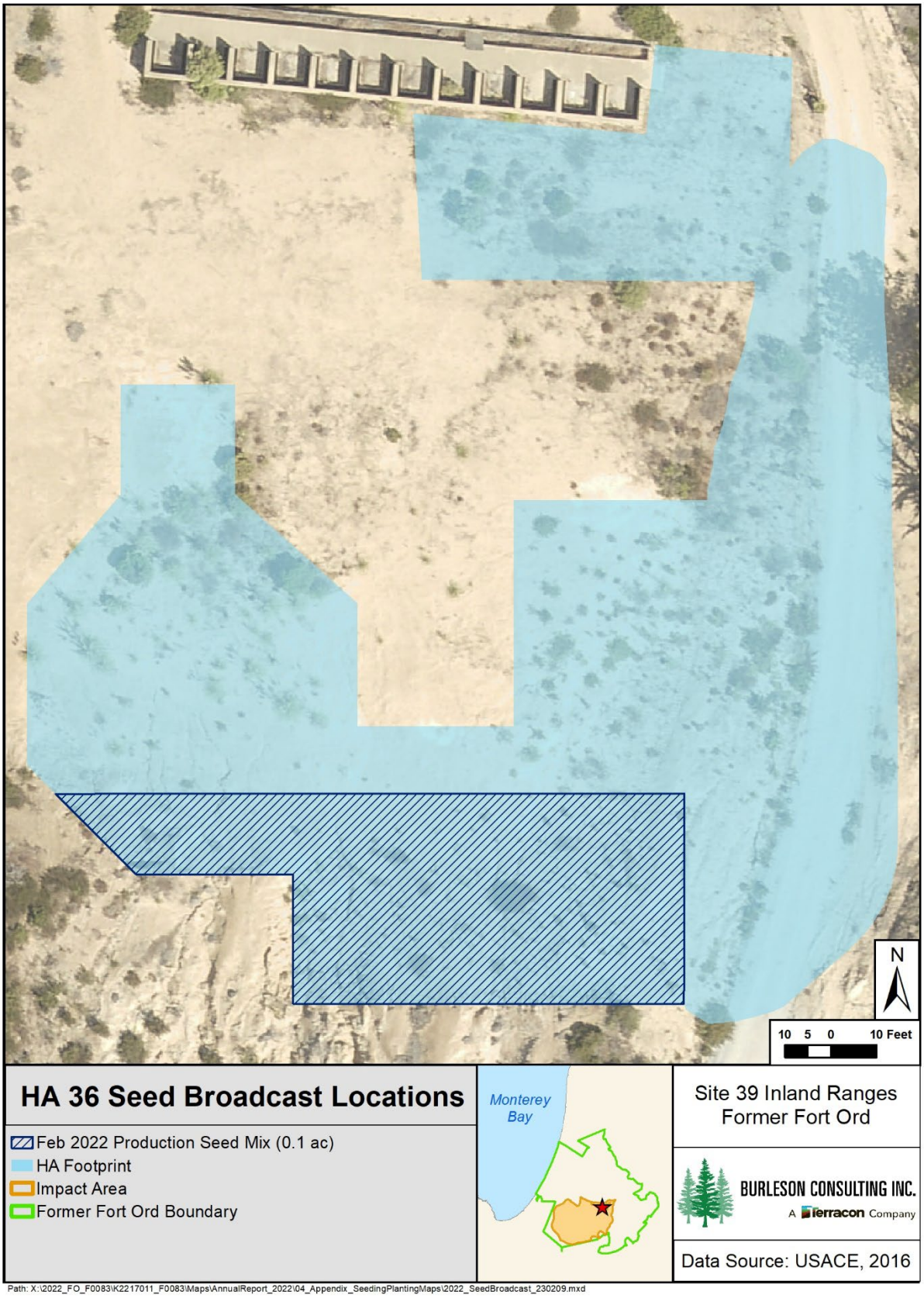

Figure B-4. HA 36 Seed Broadcast Locations, Former Fort Ord

Table B-8. HA 36 Production Seed Mix (Feb 2022)

Species	Amount (lb)
Achillea millefolium **(common yarrow)**	0.4
Acmispon glaber **(deerweed)**	0.8
Elymus glaucus **(blue wild-rye)**	1.0
Stipa pulchra **(purple needlegrass)**	1.0
TOTAL	**3.2**

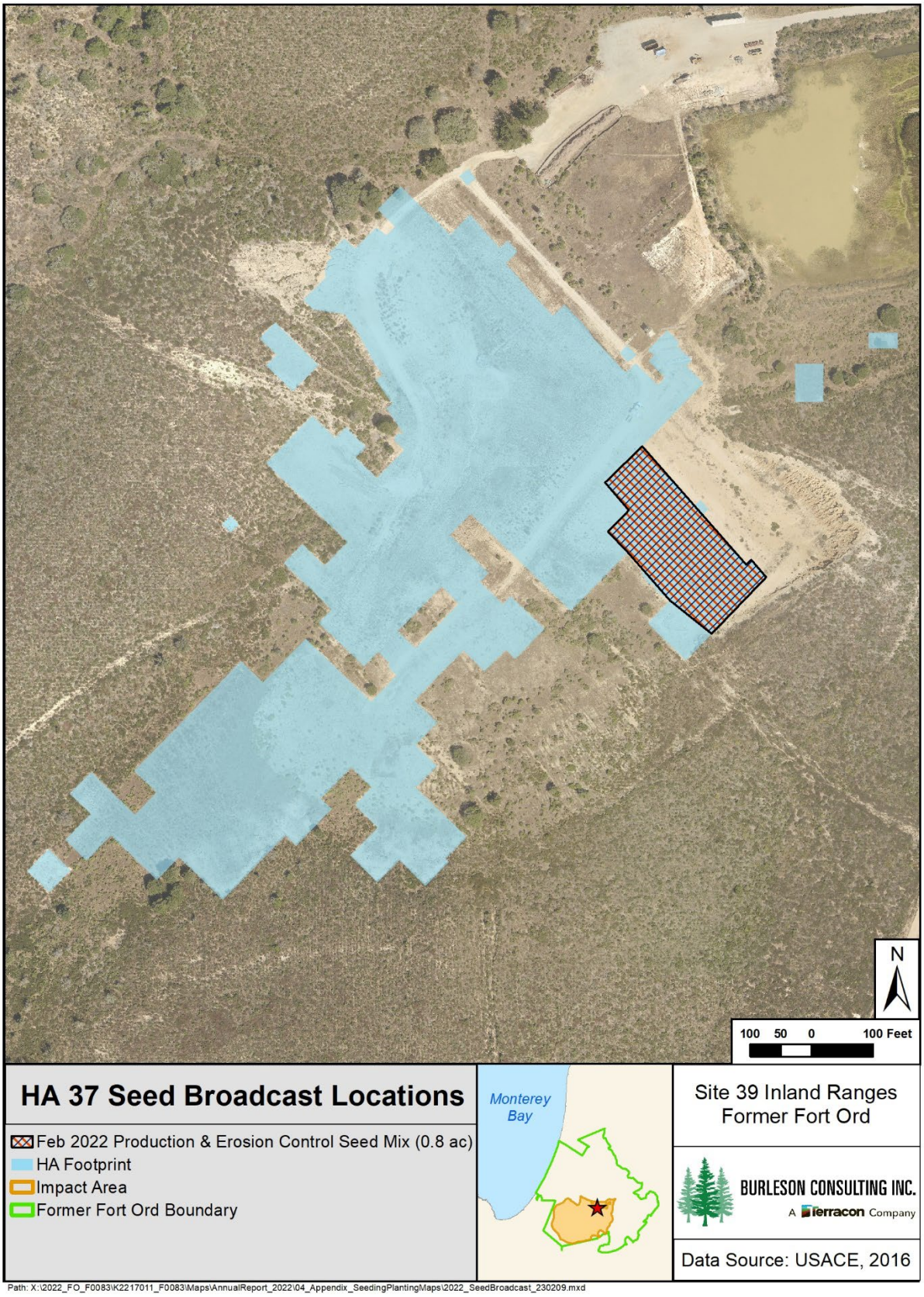

Figure B-5. HA 37 Seed Broadcast Locations, Former Fort Ord

Table B-9. HA 37 Erosion Control Seed Mix (Mar 2022)

Species	Amount (lb)
Elymus glaucus **(blue wild-rye)**	3.60
Hordeum sp. **(sterile barley)**	5.40
Stipa pulchra **(purple needlegrass)**	0.45
TOTAL	**9.45**

Table B-10. HA 37 Production Seed Mix (Mar 2022)

Species	Amount (lb)
Achillea millefolium **(common yarrow)**	2.90
Acmispon glaber **(deerweed)**	5.80
Elymus glaucus **(blue wild-rye)**	7.25
Stipa pulchra **(purple needlegrass)**	7.25
TOTAL	**23.20**

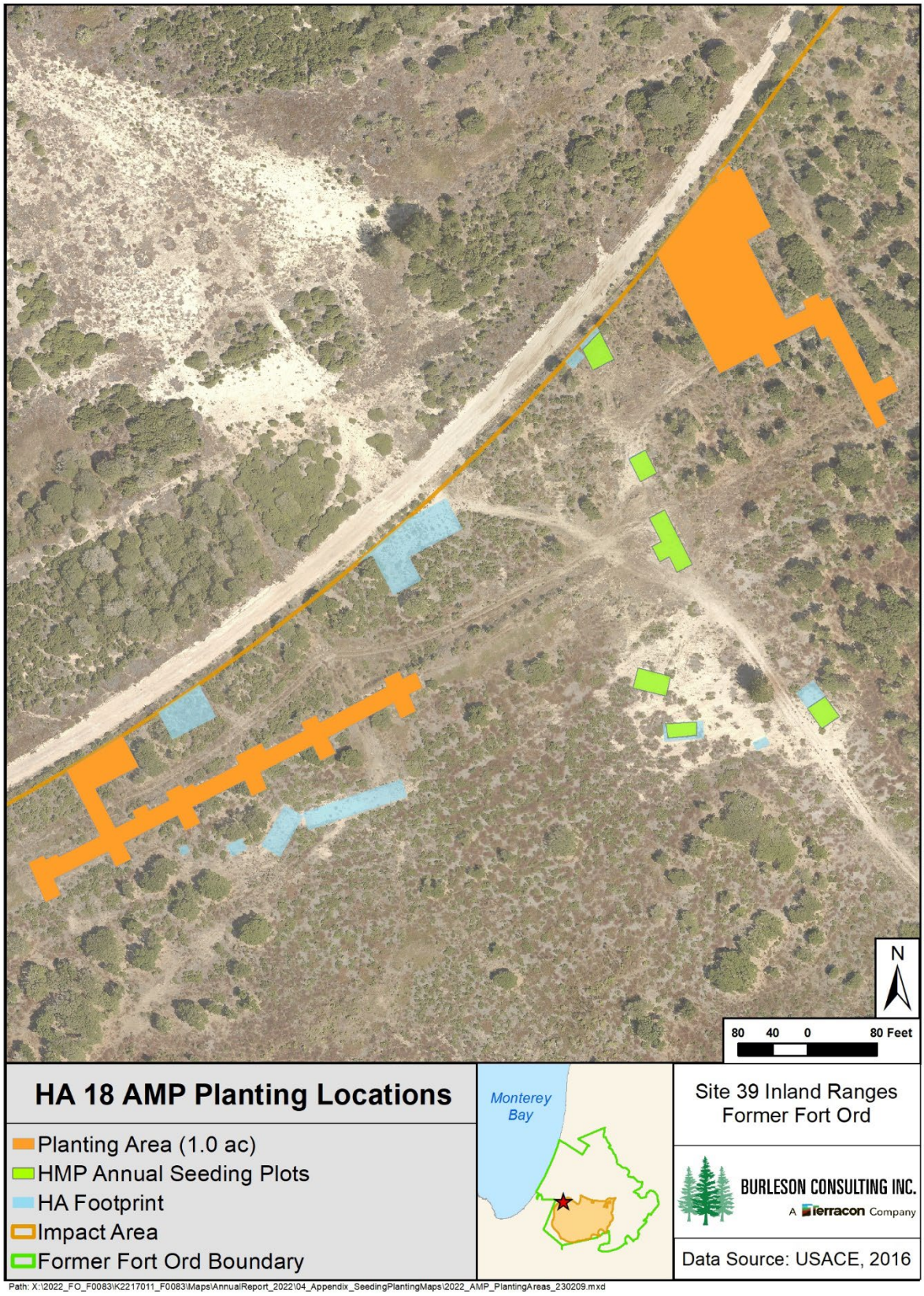

Figure B-6. HA 18 Planting Locations, Former Fort Ord

Table B-11. HA 18 Plant Installation

Species	Species Code	Feb 2022	Dec 2022	Total # per Species
Ceanothus dentatus **(dwarf ceanothus)**	CEDE	25	-	25
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	-	100	100
TOTAL		**25**	**100**	**125**

*HMP species

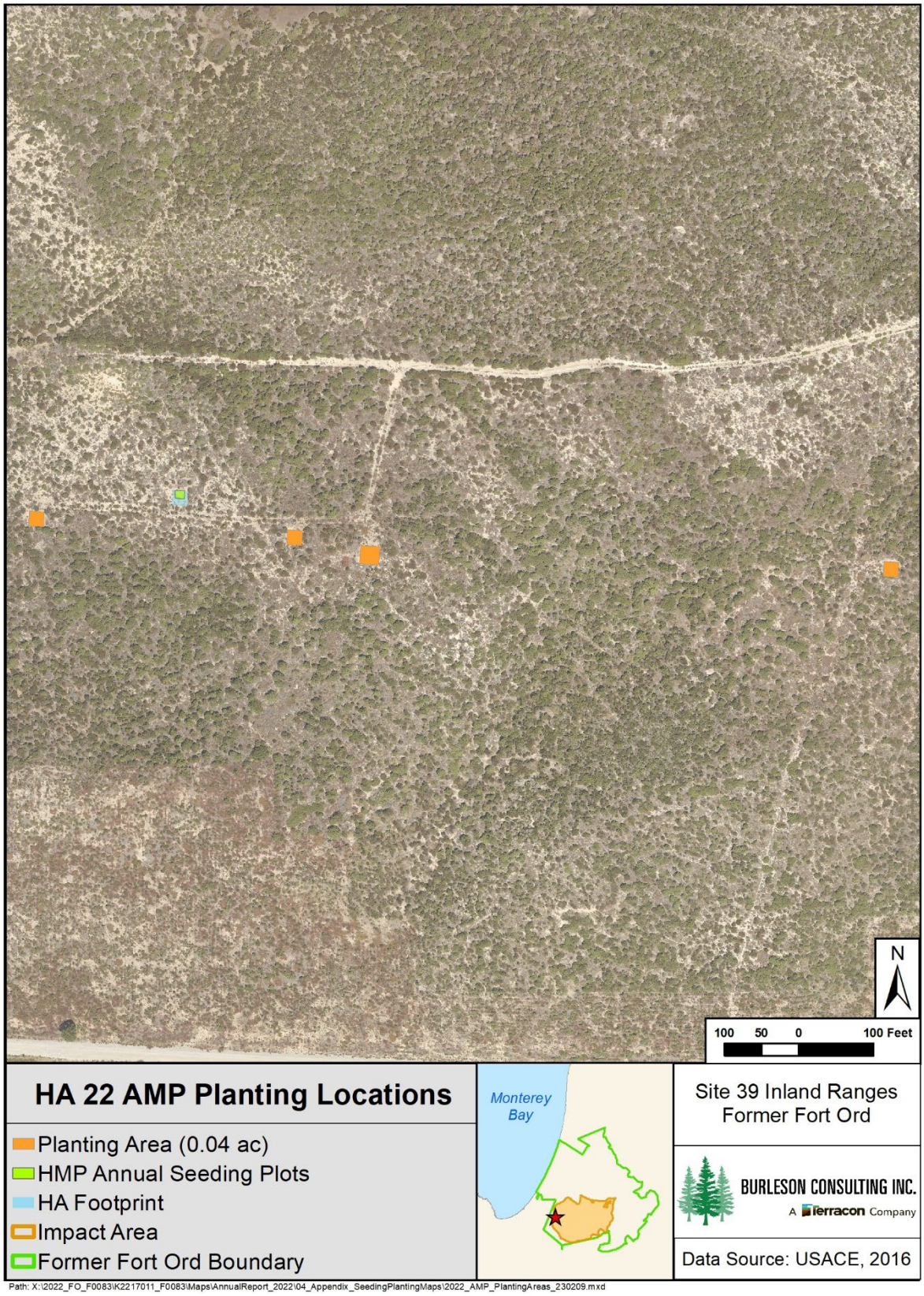

Figure B-7. HA 22 Planting Locations, Former Fort Ord

Table B-12. HA 22 Plant Installation (Dec 2022)

Species	Species Code	Total # per Species
*Arctostaphylos pumila** **(sandmat manzanita)**	ARPU	20
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	20
*Ericameria fasciculata** **(Eastwood's goldenbush)**	ERFA	40
TOTAL		**80**

*HMP species

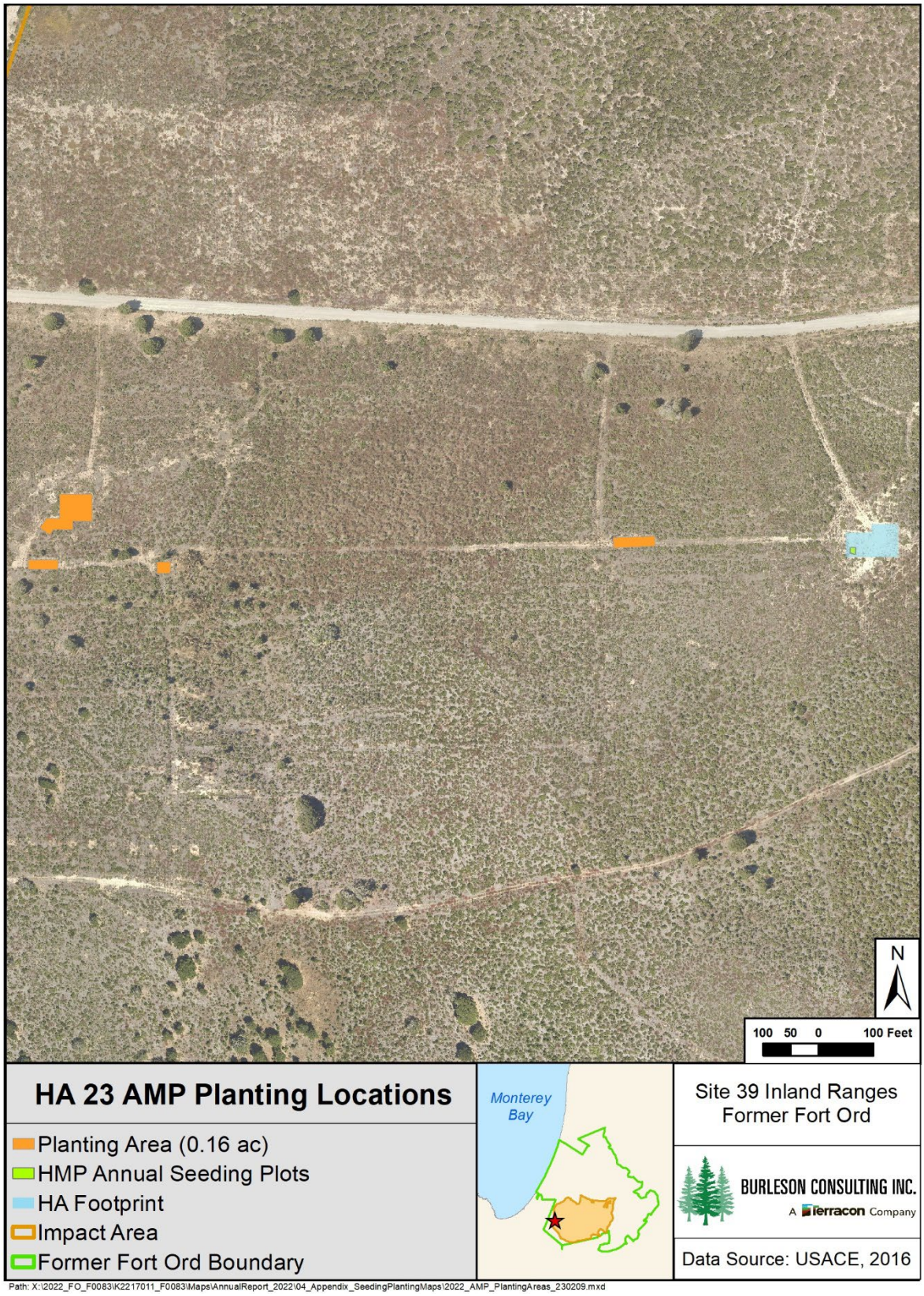

Figure B-8. HA 23 Planting Locations, Former Fort Ord

Table B-13. HA 23 Plant Installation (Jan 2023)

Species	Species Code	Total # per Species
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	20
*Ericameria fasciculata** **(Eastwood's goldenbush)**	ERFA	40
TOTAL		**60**

*HMP species

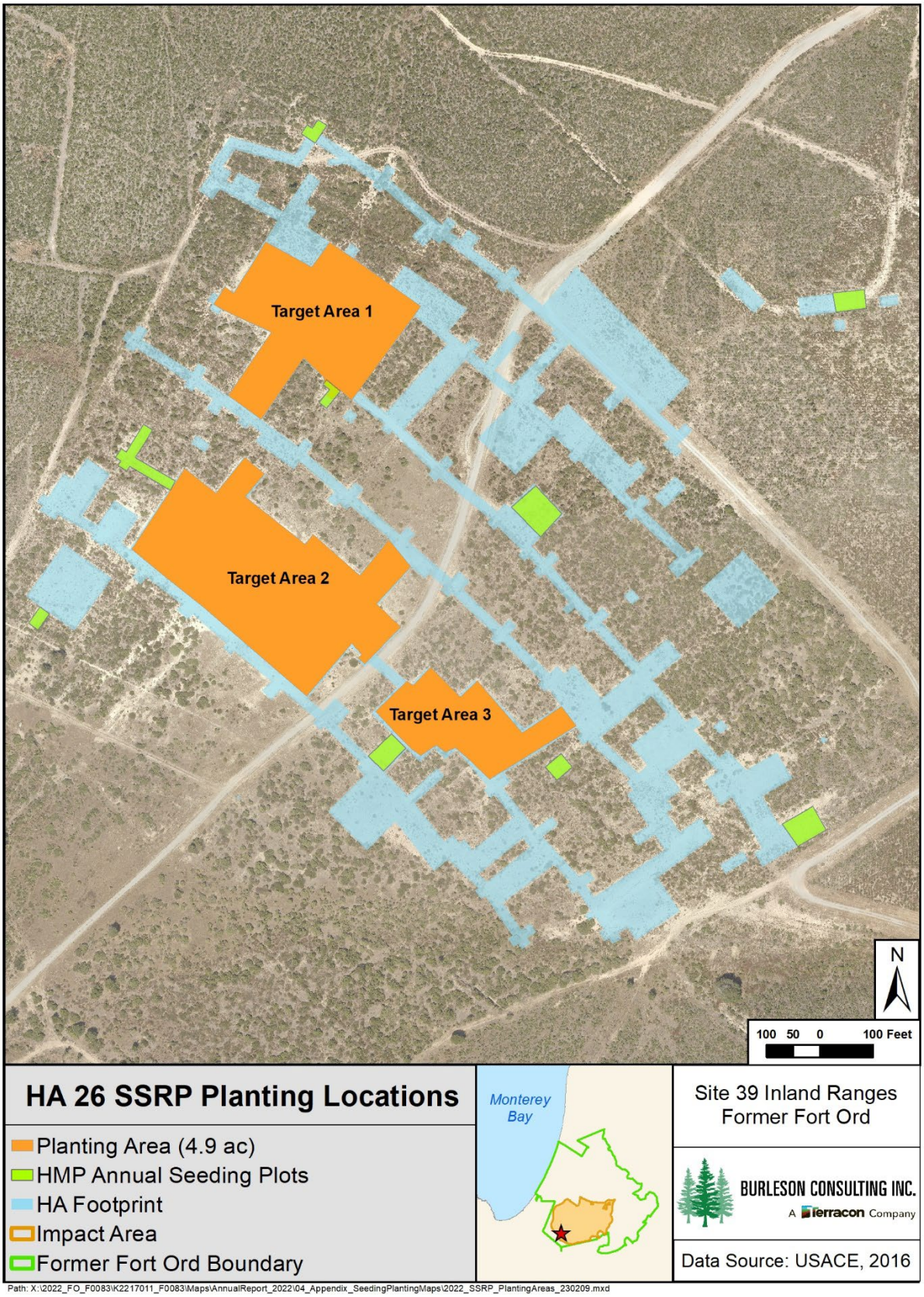

Figure B-9. HA 26 Planting Locations, Former Fort Ord

Table B-14. HA 26 Plant Installation (Dec 2021-Jan 2022)

Species	Species Code	Plant Installation by Sub-Area (#)			Total # per Species
		Area 1	Area 2	Area 3	
Acmispon glaber **(deerweed)**	ACGL	59	59	59	177
Achillea millefolium **(common yarrow)**	ACMI	111	-	15	126
Adenostoma fasciculata **(chamise)**	ADFA	70	25	40	135
*Arctostaphylos pumila** **(sandmat manzanita)**	ARPU	128	-	-	128
Arctostaphylos tomentosa **(shaggy-bark manzanita)**	ARTO	-	90	49	139
Baccharis pilularis **(coyote brush)**	BAPI	24	34	4	62
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	46	80	-	126
Crocanthemum scoparium **(peak rush-rose)**	CRSC	85	46	71	202
Diplacus aurantiacus **(sticky monkeyflower)**	DIAU	-	126	-	126
*Ericameria fasciculata** **(Eastwood's goldenbush)**	ERFA	25	50	26	101
Eriophyllum confertiflorum **(golden yarrow)**	ERCO	-	101	-	101
Horkelia cuneata **(wedge-leaved horkelia)**	HOCU	-	127	50	177
Lupinus arboreus **(yellow bush lupine)**	LUAR	5	5	5	15
Salvia mellifera **(black sage)**	SAME	-	126	-	126
TOTAL		**553**	**869**	**319**	**1,741**

*HMP species

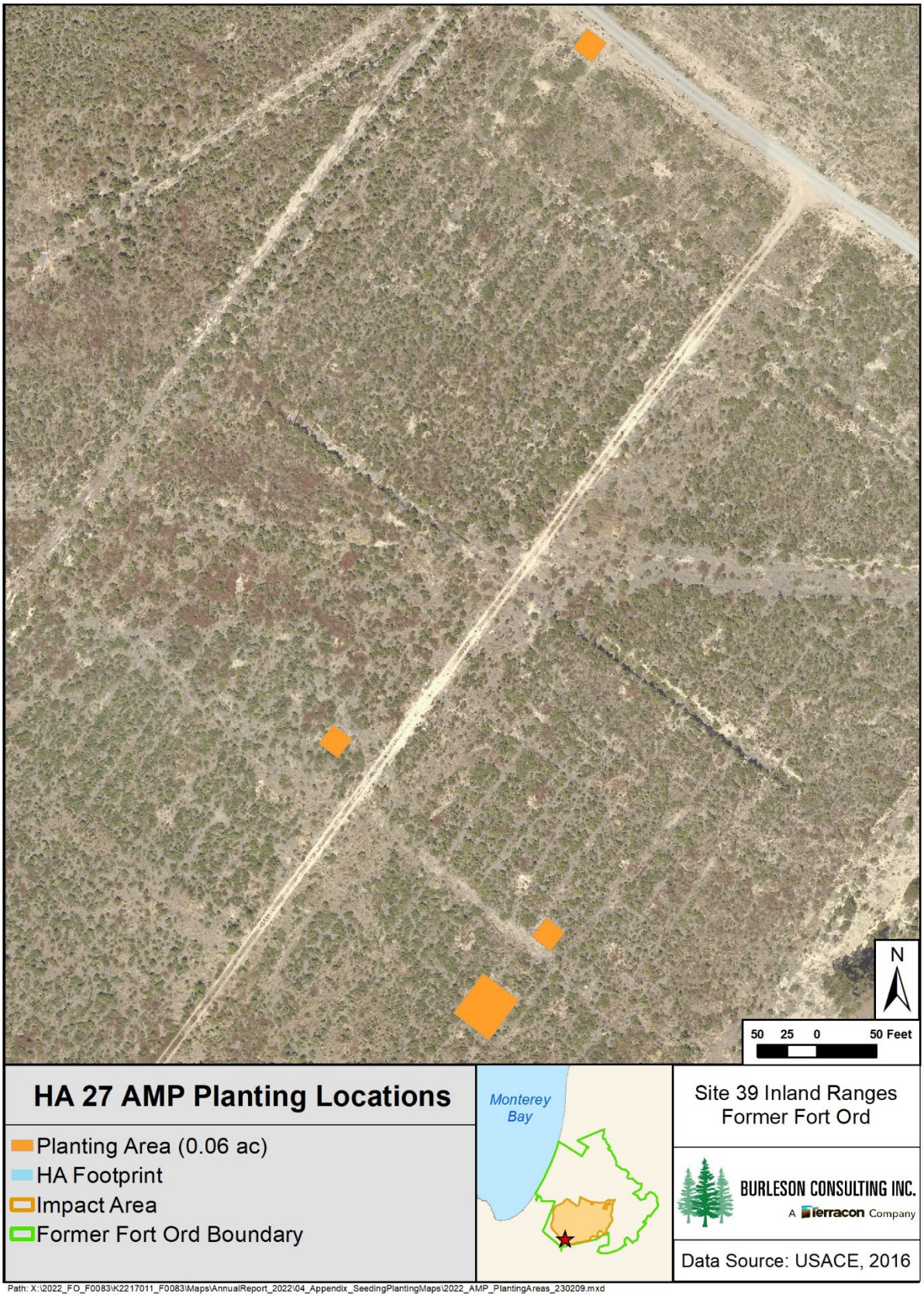

Figure B-10. HA 27 Planting Locations, Former Fort Ord

Table B-15. HA 27 Plant Installation

Species	Species Code	Feb 2022 (#)	Jan 2023 (#)	Total # per Species
*Arctostaphylos pumila** **(sandmat manzanita)**	ARPU	25	20	45
TOTAL		**25**	**20**	**45**

*HMP species

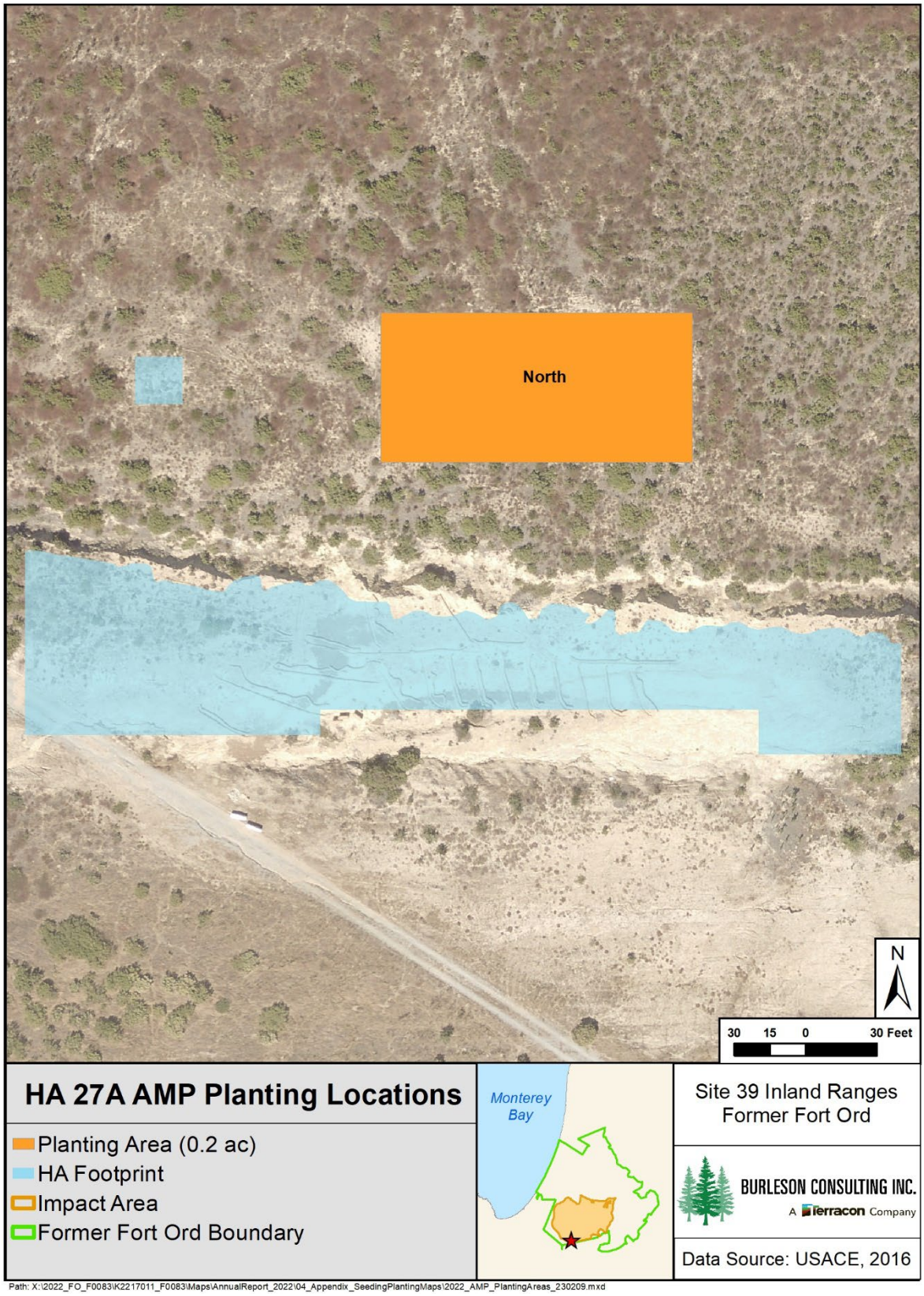

Figure B-11. HA 27A North Planting Locations, Former Fort Ord

Table B-16. HA 27A Plant Installation (Jan 2022)

Species	Species Code	Total # per Species
*Arctostaphylos montereyensis** **(Monterey manzanita)**	ARMO	25
TOTAL		**25**

*HMP species

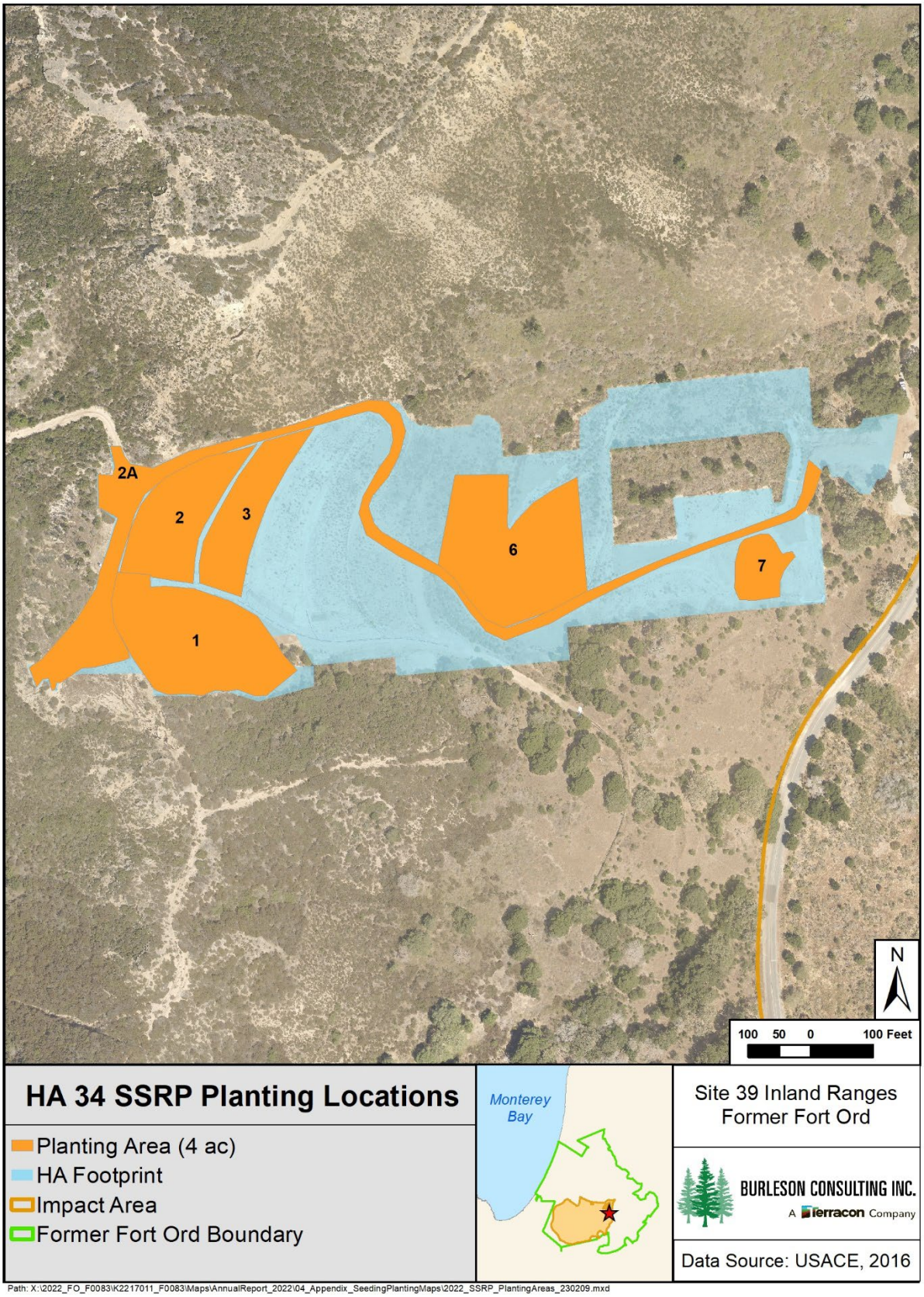

Figure B-12. HA 34 Planting Locations, Former Fort Ord

Table B-17. HA 34 Plant Installation (Jan 2022)

Species	Species Code	Plant Installation by Sub-Area (#)				Total # per Species
		1	2	3	6	
Achillea millefolium **(common yarrow)**	ACMI	-	18	18	-	36
Acmispon glaber **(deerweed)**	ACGL	40	68	68	-	176
Adenostoma fasciculata **(chamise)**	ADFA	48	-	-	-	48
Artemisia californica **(California sagebrush)**	ARCA	-	30	-	30	60
*Arctostaphylos hookeri** **(Hooker's manzanita)**	ARHO	24	-	24	-	48
*Arctostaphylos montereyensis** **(Monterey manzanita)**	ARMO	24	24	-	-	48
Arctostaphylos tomentosa **(shaggy-bark manzanita)**	ARTO	24	-	-	24	48
Baccharis pilularis **(coyote brush)**	BAPI	-	-	30	30	60
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	30	-	-	30	60
Crocanthemum scoparium **(peak rush-rose)**	CRSC	40	63	63	-	166
Diplacus aurantiacus **(sticky monkeyflower)**	DIAU	30	44	44	-	118
Eriophyllum confertiflorum **(golden yarrow)**	ERCO	31	32	31	-	94
Horkelia cuneata **(wedge-leaved horkelia)**	HOCU	54	54	54	-	162
Lupinus arboreus **(yellow bush lupine)**	LUAR	20	20	20	-	60
Salvia mellifera **(black sage)**	SAME	-	47	-	47	94
TOTAL		**365**	**400**	**352**	**161**	**1,278**

*HMP species

Table B-18. HA 34 Plant Installation (Dec 2022)

Species	Species Code	Plant Installation by Sub-Area (#)		Total # per Species
		1	2A	
Adenostoma fasciculata **(chamise)**	ADFA	-	96	96
Artemisia californica **(California sagebrush)**	ARCA	-	70	70
*Arctostaphylos hookeri** **(Hooker's manzanita)**	ARHO	84	-	84
*Arctostaphylos montereyensis** **(Monterey manzanita)**	ARMO	59	-	59
Arctostaphylos tomentosa **(shaggy-bark manzanita)**	ARTO	66	-	66
Baccharis pilularis **(coyote brush)**	BAPI	-	60	60
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	89	-	89
Crocanthemum scoparium **(peak rush-rose)**	CRSC	-	183	183
Diplacus aurantiacus **(sticky monkeyflower)**	DIAU	-	118	118
Eriophyllum confertiflorum **(golden yarrow)**	ERCO	-	94	94
Horkelia cuneata **(wedge-leaved horkelia)**	HOCU	-	179	179
Lupinus arboreus **(yellow bush lupine)**	LUAR	-	65	65
Salvia mellifera **(black sage)**	SAME	-	143	143
TOTAL		**298**	**1,008**	**1,306**

*HMP species

Table B-19. HA 34 Plant Installation (Feb 2023)

Species	Species Code	Plant Installation by Sub-Area (#)		Total # per Species
		1	7	
Achillea millefolium **(common yarrow)**	ACMI	-	10	10
Acmispon glaber (deerweed)	ACGL	-	40	40
Adenostoma fasciculata **(chamise)**	ADFA	-	60	60
*Arctostaphylos hookeri** **(Hooker's manzanita)**	ARHO	30	-	30
*Arctostaphylos montereyensis** **(Monterey manzanita)**	ARMO	30	-	30
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	30	-	30
Crocanthemum scoparium **(peak rush-rose)**	CRSC	-	30	30
Eriophyllum confertiflorum **(golden yarrow)**	ERCO	-	10	10
Horkelia cuneata **(wedge-leaved horkelia)**	HOCU	-	10	10
Salvia mellifera **(black sage)**	SAME	-	50	50
TOTAL		**90**	**210**	**300**

*HMP species

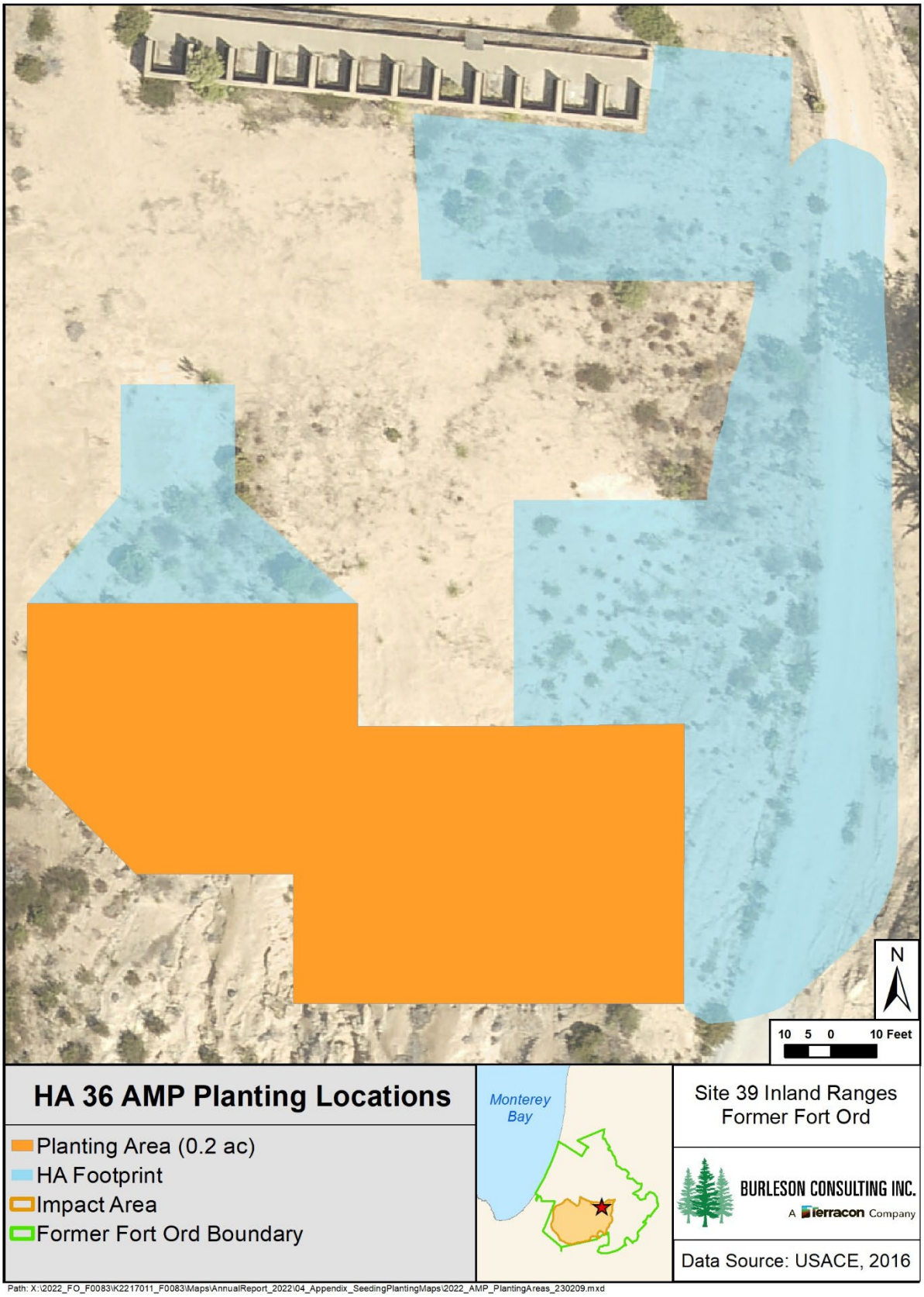

Figure B-13. HA 36 Active Restoration Locations, Former Fort Ord

Table B-20. HA 36 Plant Installation

Species	Species Code	Jan 2022	Jan 2023	Total # per Species
*Arctostaphylos montereyensis** **(Monterey manzanita)**	ARMO	-	59	59
*Arctostaphylos pumila** **(sandmat manzanita)**	ARPU	50	-	50
*Ericameria fasciculata** **(Eastwood's goldenbush)**	ERFA	75	-	75
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	-	60	60
TOTAL		**125**	**119**	**244**

*HMP species

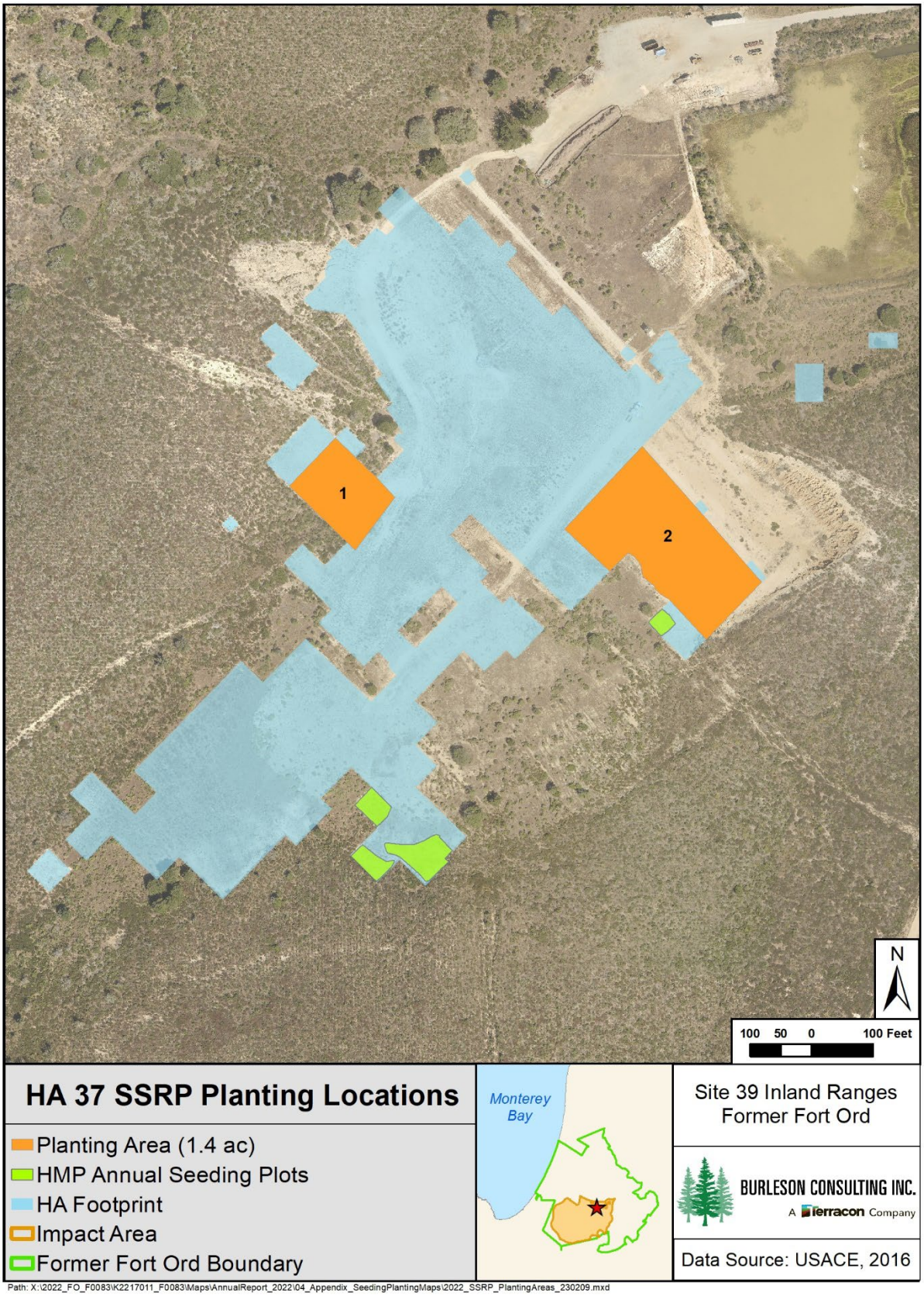

Figure B-14. HA 37 Planting Locations, Former Fort Ord

Table B-21. HA 37 Plant Installation (Feb 2022)

Species	Species Code	Plant Installation by Sub-Area (#)		Total # per Species
		1	2	
Achillea millefolium **(common yarrow)**	ACMI	-	15	15
Acmispon glaber **(deerweed)**	ACGL	-	19	19
Adenostoma fasciculata **(chamise)**	ADFA	15	25	40
*Arctostaphylos hookeri** **(Hooker's manzanita)**	ARHO	5	6	11
*Arctostaphylos montereyensis** **(Monterey manzanita)**	ARMO	9	10	19
*Arctostaphylos pumila** **(sandmat manzanita)**	ARPU	5	10	15
Arctostaphylos tomentosa **(shaggy-bark manzanita)**	ARTO	20	32	52
Baccharis pilularis **(coyote brush)**	BAPI	5	20	25
*Ceanothus rigidus** **(Monterey ceanothus)**	CERI	9	10	19
Crocanthemum scoparium **(peak rush-rose)**	CRSC	9	20	29
Diplacus aurantiacus **(sticky monkeyflower)**	DIAU	9	10	19
Eriophyllum confertiflorum **(golden yarrow)**	ERCO	5	10	15
Frangula californica **(California coffeeberry)**	FRCA	10	-	10
Garrya elliptica **(coast silk tassel)**	GAEL	10	5	15
Horkelia cuneata **(wedge-leaved horkelia)**	HOCU	-	19	19
Lupinus chamissonis/albifrons **(silver bush lupine)**	LUCH/LUAL	19	-	19
Lupinus arboreus **(yellow bush lupine)**	LUAR	26	-	26
Salvia mellifera **(black sage)**	SAME	13	10	23
TOTAL		**169**	**221**	**390**

*HMP species

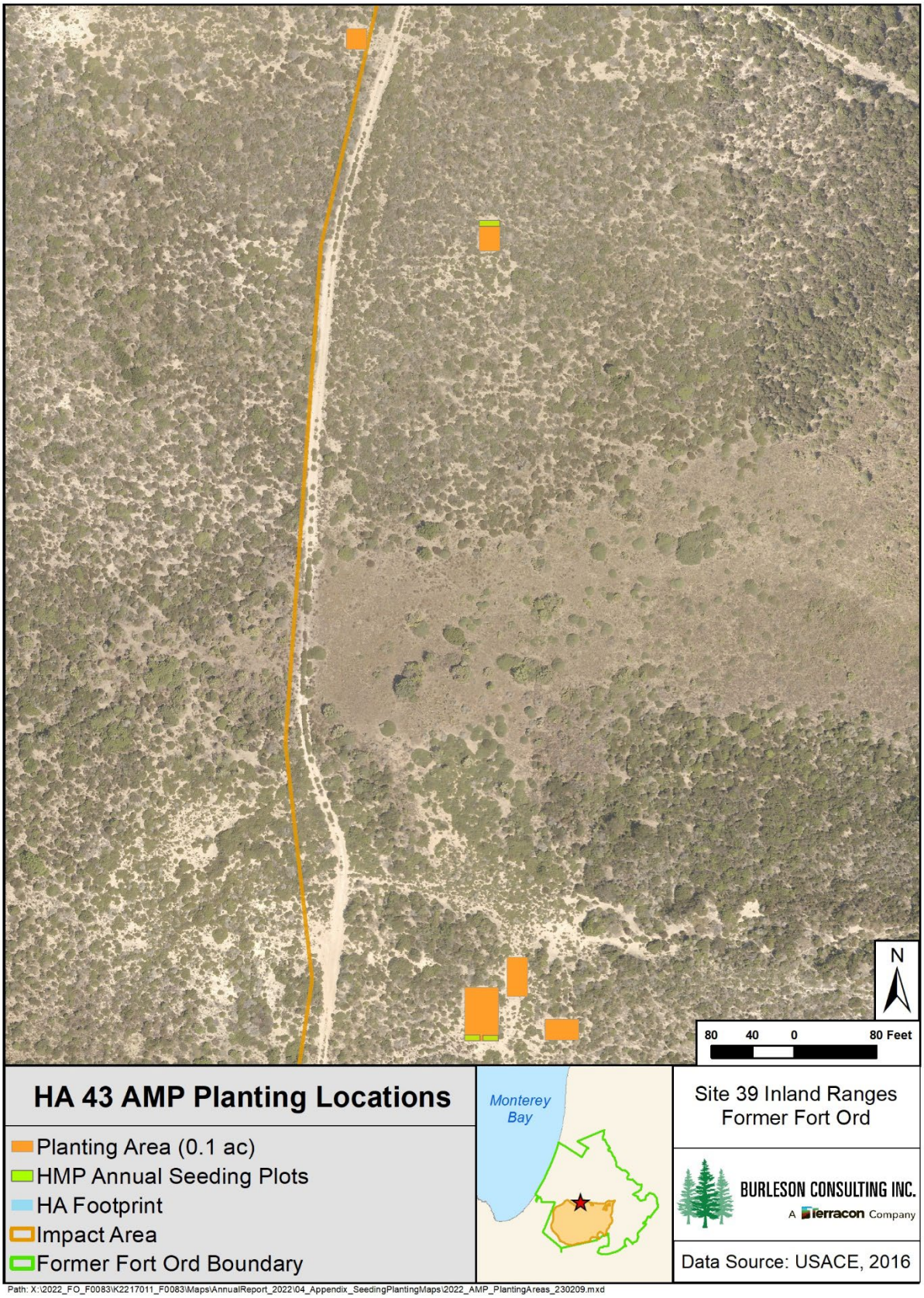

Figure B-15. HA 43 Planting Locations, Former Fort Ord

Table B-22. HA 43 Plant Installation (Feb 2022)

Species	Species Code	Total # per Species
*Ericameria fasciculata** **(Eastwood's goldenbush)**	ERFA	75
TOTAL		**75**

*HMP species

APPENDIX C

Photo Log

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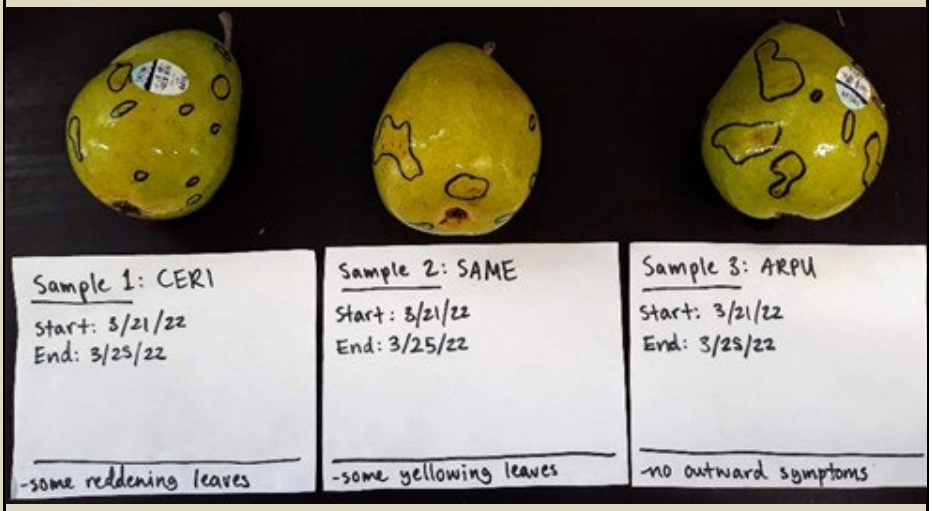
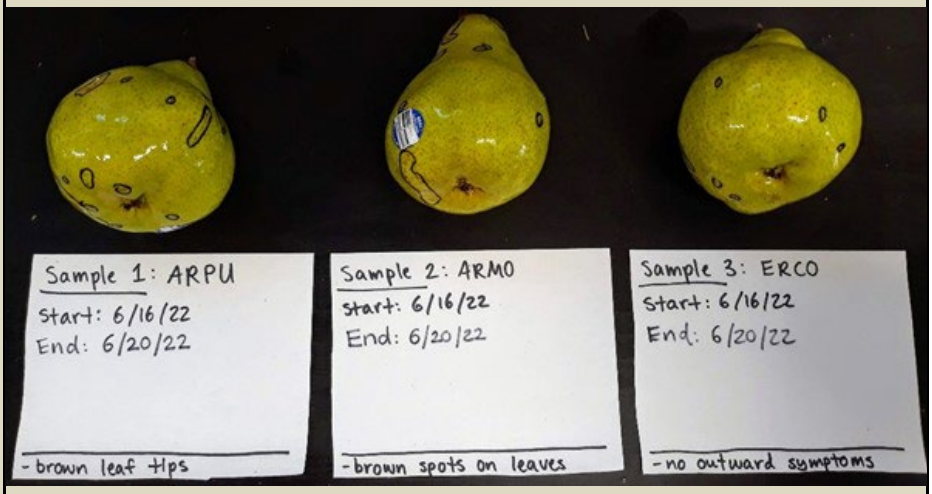
Photo Description	Photo
Burleson Carmel Valley Native Plant Nursery Negative results of the March pear test **C-1**	
Burleson Carmel Valley Native Plant Nursery Negative results of the June pear test **C-2**	

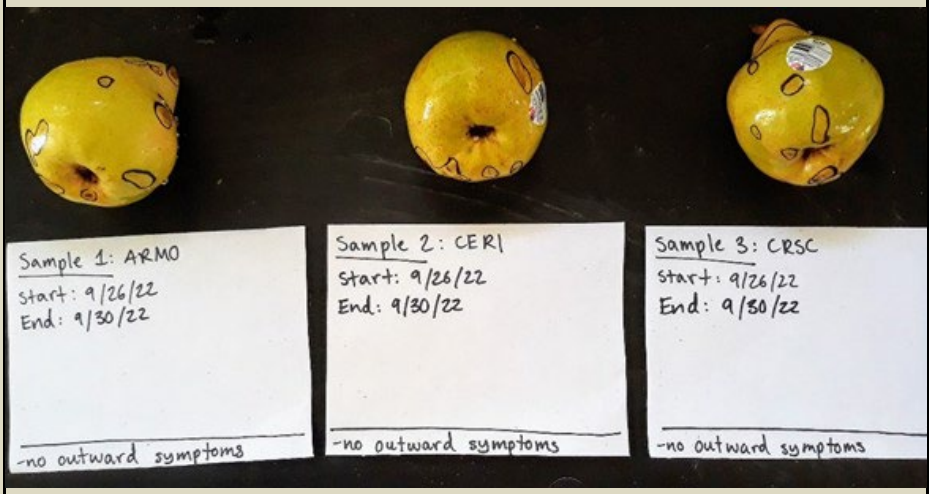
Photo Description	Photo
Burleson Carmel Valley Native Plant Nursery Negative results of the September pear test **C-3**	
Burleson Carmel Valley Native Plant Nursery Negative results of the December pear test. Pear test started in December, results in January. **C-4**	

Photo Description	Photo
Seed Collection Burleson biologist collecting black sage (*Salvia mellifera*) seed **C-5**	
Seed Collection Burleson biologist collecting sticky monkeyflower (*Diplacus aurantiacus*) seed **C-6**	

Photo Description	Photo
Seed Collection Burleson biologist collecting Monterey ceanothus (*Ceanothus rigidus*) seed **C-7**	
Seed Collection Monterey ceanothus seed **C-8**	

Photo Description	Photo
Seed Collection Burleson biologist collecting golden yarrow (*Eriophyllum confertiflorum)* seed **C-9**	
Seed Collection Burleson biologist collecting peak rush-rose (*Crocanthemum scoparium)* seed **C-10**	

Photo Description	Photo
Seed Collection Burleson biologist collecting wedge-leaved horkelia (*Horkelia cuneata*) seed **C-11**	
Seed Collection Wedge-leaved horkelia seed **C-12**	

Photo Description	Photo
Seed Collection Burleson biologist collecting California sagebrush (*Artemisia californica)* seed **C-13**	
Seed Collection Burleson biologist collecting coyote brush (*Baccharis pilularis*) seed **C-14**	

Photo Description	Photo
Seed Production Purple needlegrass production plot at S&S Seeds in June 2022 **C-15**	
Seed Production Purple needlegrass production plot at S&S Seeds in June 2022 after being cut **C-16**	

Photo Description	Photo
Plant Propagation Burleson nursery manager transplanting Monterey ceanothus **C-17**	
Plant Propagation Monterey ceanothus in cones **C-18**	

Photo Description	Photo
Plant Propagation Deerweed (*Acmispon glaber)* seed tray **C-19**	
Plant Propagation Wedge-leaved horkelia in deepots **C-20**	

Photo Description	Photo
Plant Propagation Monterey manzanita (*Arctostaphylos montereyensis*) cuttings in seed tray **C-21**	
Plant Propagation Monterey manzanita in cones **C-22**	

Photo Description	Photo
Plant Propagation Roots of Monterey manzanita **C-23**	
Plant Propagation Burleson biologist watering plants at Carmel Valley Native Plant Nursery **C-24**	

Photo Description	Photo
Passive Restoration Burleson biologist applying seed at HA 34 **C-25**	
Passive Restoration Burleson biologists covering seed with straw at HA 34 **C-26**	

Photo Description	Photo
Passive Restoration HA 34 after seed broadcast **C-27**	
Passive Restoration Burleson biologist raking seed at HA 34 **C-28**	

Photo Description	Photo
Active Restoration Burleson biologist installing wedge-leaved horkelia at HA 36 **C-29**	
Active Restoration Burleson biologist installing California sagebrush at HA 36 **C-30**	

Photo Description	Photo
Active Restoration Burleson biologist installing plants at HA 43 **C-31**	
Active Restoration Burleson biologists installing plants at HA 34 **C-32**	

Photo Description	Photo
Active Restoration Burleson biologist installing Shaggy-barked manzanita at HA 34 **C-33**	
Active Restoration Burleson biologists installing plants at HA 34 **C-34**	

Photo Description	Photo
Monitoring Monterey spineflower (*Chorizanthe pungens*) **C-35**	
Monitoring Sand gilia (*Gilia tenuiflora ssp. arenaria*) **C-36**	

Photo Description	Photo
Monitoring Seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis*) **C-37**	
Monitoring Burleson biologist surveying for HMP Annuals **C-38**	

Photo Description	Photo
Monitoring Burleson biologist conducting a vegetative cover survey **C-39**	
Monitoring Burleson biologist installing rebar for a new transect. **C-40**	

Photo Description	Photo
Erosion Control Repairs Burleson biologist covering production seed with straw at HA 36 **C-41**	
Erosion Control Repairs Completed seed and straw installation at HA 36 **C-42**	

Photo Description	Photo
Erosion Control Repairs Completed wattle installation at HA 37 **C-43**	
Erosion Control Repairs Burleson biologists installing wattles at HA 37 **C-44**	

Photo Description	Photo
Erosion Control Repairs Burleson biologist installing coir logs at HA 37 **C-45**	
Erosion Control Repairs Burleson biologist installing coir fabric at HA 37 **C-46**	

Photo Description	Photo
Erosion Control Repairs Burleson biologists installing wattles at HA 34 **C-47**	
Erosion Control Repairs Wattle installation at HA 37 **C-48**	

Photo Description	Photo
Irrigation Burleson biologist removing irrigation lines at HA 26 **C-49**	
Irrigation Burleson biologists using handheld saw to cut polyvinyl chloride pipes at HA 26 **C-50**	

Photo Description	Photo
Irrigation Burleson biologists removing large polyvinyl chloride pipes at HA 26 **C-51**	
Irrigation Removed irrigation lines from HA 26 **C-52**	

APPENDIX D

Photo Points

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Photo Points	
	
HA 18 | October 2011	HA 18 | April 2022

Photo Points	
	
HA 19 | May 2013	HA 19 | April 2022

Photo Points	
	
HA 22 | October 2011	HA 22 | April 2022

Photo Points	
	
HA 23 | October 2011	HA 23 | April 2022

Photo Points	
	
HA 26 | May 2016	HA 26 | April 2022

Photo Points	
	
HA 27 | October 2011	HA 27 | April 2022

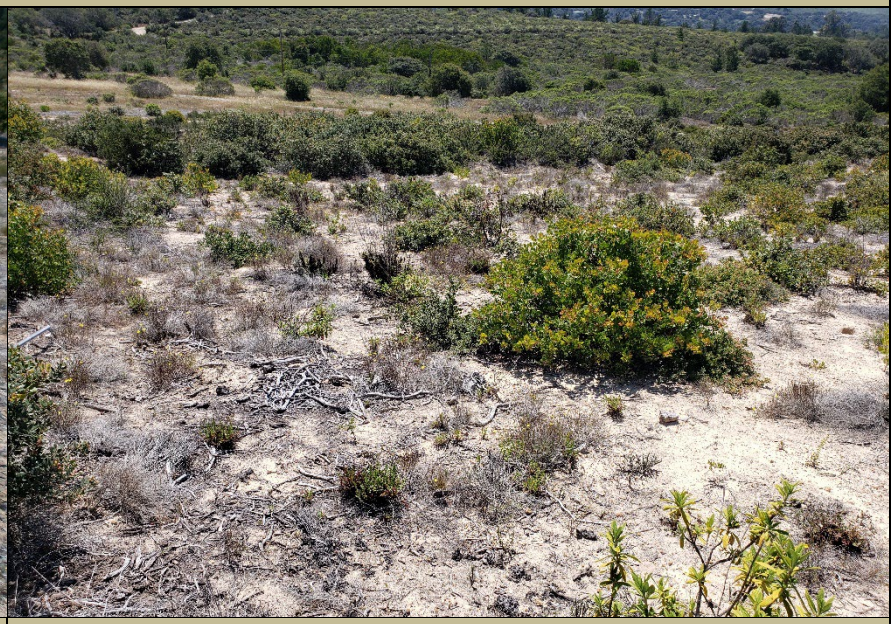
Photo Points	
	
HA 27A North | October 2011	HA 27A North | April 2022

Photo Points	
	
HA 27A South | October 2011	HA 27A South | April 2022

Photo Points	
	
HA 28 | April 2014	HA 28 | April 2022

Photo Points	
	
HA 29 | October 2011	HA 29 | April 2022

Photo Points	
	
HA 33 | October 2011	HA 33 | April 2022

Photo Points	
	
HA 34 | January 2013	HA 34 | April 2022

Photo Points	
	
HA 36 | October 2011	HA 36 | April 2022

Photo Points	
	
HA 37 | April 2014	HA 37 | April 2022

Photo Points	
	
HA 38 | April 2014	HA 38 | April 2022

Photo Points	
	
HA 39/40 | October 2011	HA 39/40 | April 2022

Photo Points	
	
HA 43 | October 2011	HA 43 | April 2022

Photo Points	
	
HA 44 | May 2016	HA 44 | April 2022

Photo Points	
	
HA 48 | April 2016	HA 48 | April 2022

Photo Points	
	
Austin Road Stockpile | May 2016	Austin Road Stockpile | April 2022

APPENDIX E

Photo Points
Time Lapse Series for HA in Year 5

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Photo Points – HA 44

May 2016

May 2018

April 2019

April 2020

April 2021

May 2022

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APPENDIX F

Photo Points
Time Lapse Series for HAs in Year 8

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Photo Points – HA 28

April 2014

April 2016

April 2017

May 2018

April 2019

April 2022

Photo Points – HA 34

Jan 2013

May 2016

April 2017

May 2018

April 2019

April 2022

Photo Points – HA 37

April 2016

April 2017

May 2018

April 2019

April 2020

April 2022

Photo Points – HA 38		
		
April 2015	April 2016	April 2017
		
October 2018	April 2019	April 2022

APPENDIX G

Review of Irrigation System at HA 26

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INTRODUCTION

The purpose of this review is to provide assessment of the irrigation system at HA 26 now that irrigation is completed. This document includes a summary of the system, challenges and successes, results of plant survivorship and growth data, and recommendations for future work.

IRRIGATION SYSTEM SUMMARY

Burleson subcontracted Rana Creek Design to plan and install a 6,000-gallon capacity irrigation system with 3,000 emitters to increase survivorship of installed plants in Target Areas 2 and 3 at HA 26. The installation design was approved by USACE in December of 2017. Installation occurred from January to March 2018. Two tests of the system occurred during the installation process to check for leaks in the irrigation lines. In January 2019, a Supplemental Performance Work Statement was issued and included the installation of 500 additional drip emitters to the irrigation system to select new plantings in Target Area 2.

Each emitter was staked at the base of the following shrub species previously planted by Burleson:

- Chamise (*Adenostoma fasciculatum*)
- Sandmat manzanita (*Arctostaphylos pumila*)
- Shaggy-barked manzanita (*Arctostaphylos tomentosa*)
- Coyote brush (*Baccharis pilularis*)
- Monterey ceanothus (*Ceanothus rigidus*)
- Eastwood's goldenbush (*Ericameria fasciculata*)
- Black sage (*Salvia mellifera*)

Ten irrigation events of at least 6,000 gallons of water occurred per calendar year from 2018 to 2020. In 2021 to 2022, five irrigation events occurred with 14,000 gallons of water. Water was sourced from OU-2 Ground Water Treatment Plant (OU-2 GWTP) in 2018 but was unavailable in 2019 and 2020. Water from OU-2 GWTP became available again in 2021 and 2022 but was not used to simplify logistics and reduce the fine sediments clogging the irrigation system. Table 1 provides specific details regarding the irrigation events from 2018 to 2022.

Table 1. Information on irrigation events at HA 26

Year	Number of Irrigation Events	Average Volume Per Event (gallons)	Source of Water
2018	10	7,700	OU-2 GWTP
2019	10	6,000	Sala Brothers Water Trucking
2020	10	8,960	Sala Brothers Water Trucking
2021-22	5	14,000	Sala Brothers Water Trucking

After the last irrigation event in February 2022, the system was dismantled. All materials including the PVC pipes, poly lines, spaghetti lines, emitters, and stakes were removed from the site. The two 3,000-gallon water tanks remain on site to be available to support the Army's Fort Ord Prescribed Burn Program.

Challenges

- Uneven water dispersal due to line placement and topography of site
- Wildlife chewing on equipment and displacing poly lines

- Trial and error replacing equipment due to discrepancies between planned and installed specifications of materials
- Personnel had to remain on site to regulate water dispersal
- Theft

Successes

- High plant survivorship
- Plants grew quickly
- Water delivery service (Sala Brothers Water Trucking) was easy and efficient
- UV paint extended life of above-ground PVC pipes
- Additional valves on lateral lines better controlled the amount of water going to different areas of the site

RESULTS

Burleson conducted plant survivorship surveys at HA 26 for three years after each planting event. Planting events occurred in 2018, 2019, 2020, and 2021. The data collection methods can be found in Section 6.1.3 of the 2021 Annual Report Habitat Restoration. In addition to recording the plants alive or dead, irrigation, mulch, height, and width data were recorded.

Plant survivorship data for all planting events were combined and analyzed by monitoring year. The set of species surveyed for plant survivorship was the same set of species irrigated at HA 26 because both activities focused on shrub species. Results suggest irrigation increases survivorship (see Figure 1). Irrigated plant survivorship was 84% by Year 3, whereas, non-irrigated plant survivorship was 15%. In all monitoring years, survivorship of irrigated plants was greater than non-irrigated plants by at least 30%. For plants that survived, growth as measured by height and width was greater for irrigated plants (see Figures 2 and 3). Box and whisker plots were created to analyze this trend. Mean, median, and maximum height and width values were generally greater for irrigated versus non-irrigated plants (see Tables 2 and 3). There are a few exceptions to this trend: the maximum height value in Year 1 of non-irrigated plants is seven inches greater than irrigated, the mean height value in Year 3 of non-irrigated plants is 0.9 inches greater than irrigated, and the maximum width value in Year 1 of non-irrigated plants is 1.5 inches greater than irrigated.

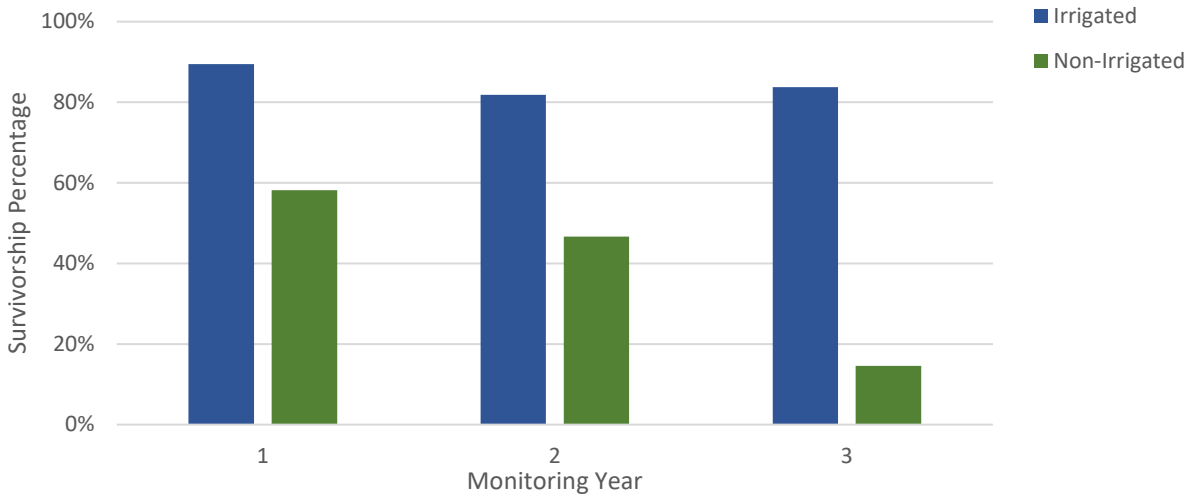

Figure 1. Survivorship Percentage of Irrigated versus Non-Irrigated Shrubs at HA 26 by Monitoring Year

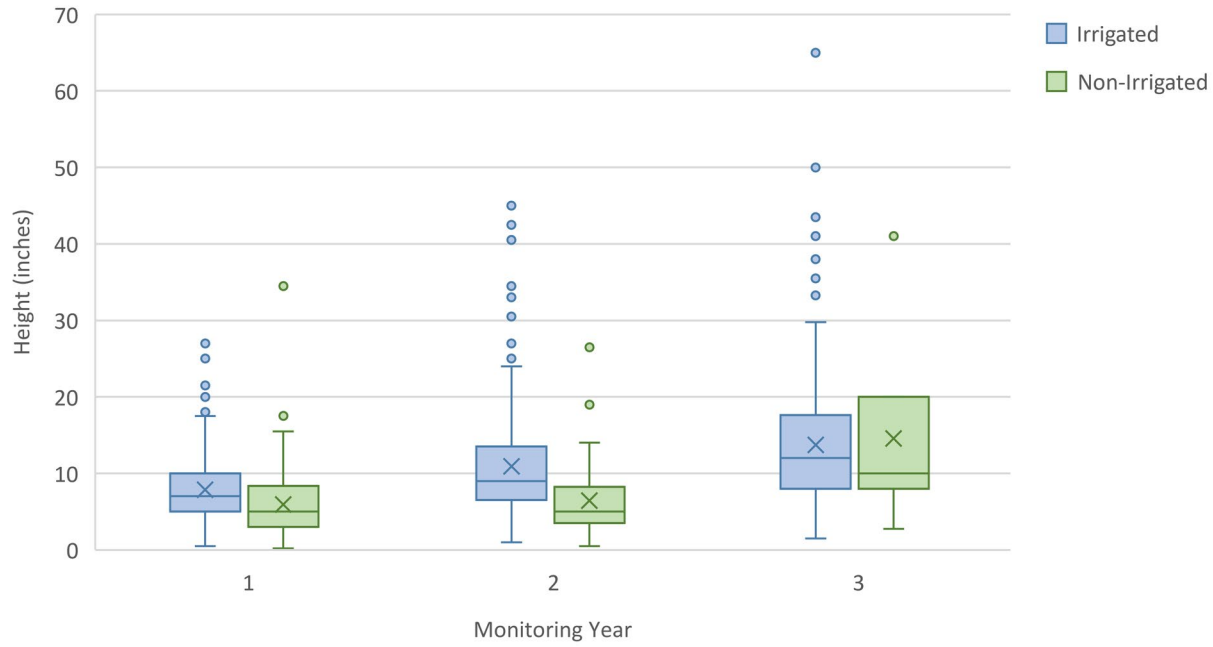

Figure 2. Height of Live Irrigated versus Non-Irrigated Plants (in) at HA 26 by Monitoring Year. Year 3 sample size of Non-Irrigated (n=7) is small.

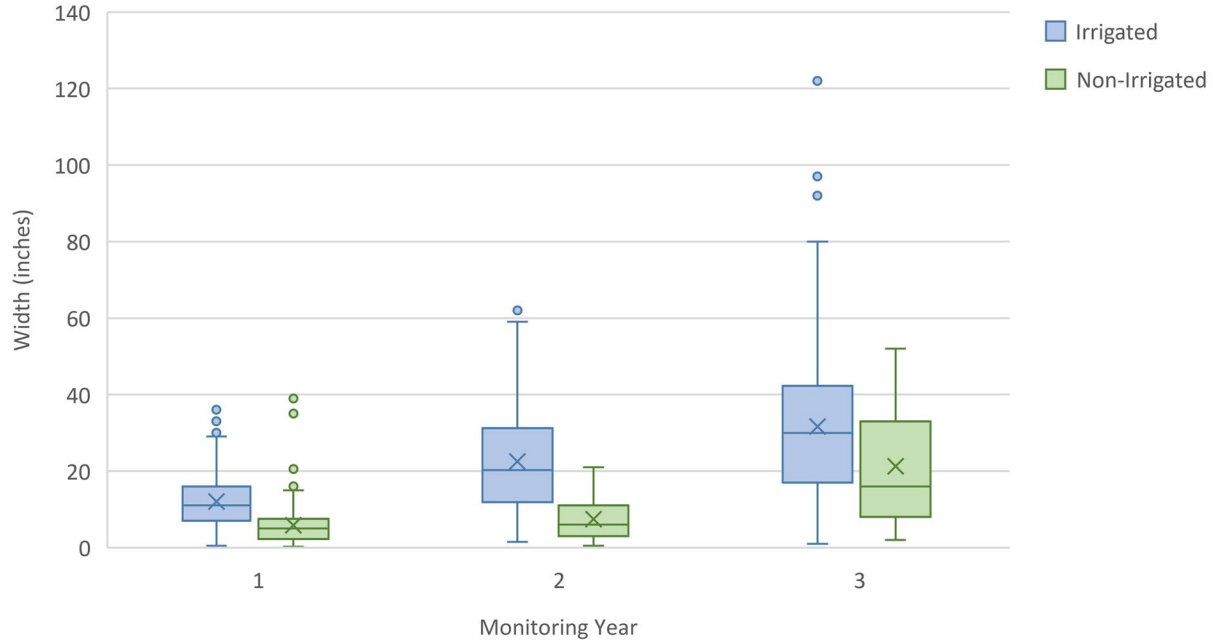

Figure 3. Width of Live Irrigated versus Non-Irrigated Plants (in) at HA 26 by Monitoring Year. Year 3 sample size of Non-Irrigated (n=7) is small.

Table 2. Height of Irrigated versus Non-Irrigated Plants (in)

Descriptive Statistics	Monitoring Years					
	1		2		3	
	Irrigated	Non-Irrigated	Irrigated	Non-Irrigated	Irrigated	Non-Irrigated
Mean	7.8	5.9	10.9	6.4	13.7	14.6
Median	7.0	5.0	9.0	5.0	12	10.0
Maximum	27.5	34.5	45.0	26.5	65.0	41.0
Sample Size*	321.0	157.0	298.0	69.0	289.0	7.0
Monitored**	360.0	270.0	364.0	148.0	345.0	48.0

*Sample Size = Living subset of monitored plants measured for height and width
**Monitored = all plants assessed for survivorship (including dead plants)

Table 3. Width of Irrigated versus Non-Irrigated Plants (in)

Descriptive Statistics	Monitoring Years					
	1		2		3	
	Irrigated	Non-Irrigated	Irrigated	Non-Irrigated	Irrigated	Non-Irrigated
Mean	12.1	5.8	22.5	7.4	31.6	21.3
Median	11.0	5.0	20.3	6.0	30.0	16.0
Maximum	37.5	39.0	64.0	21.0	122.0	52.0
Sample Size*	321.0	157.0	298.0	69.0	289.0	7.0
Monitored**	360.0	270.0	364.0	148.0	345.0	48.0

*Sample Size = Living subset of monitored plants measured for height and width
**Monitored = all plants assessed for survivorship (including dead plants)

Further analysis evaluated the use of mulch and irrigation. Survivorship was greatest in all years when mulch and irrigation were used together (see Figure 4). By Year 3, survivorship was 88% for irrigated and mulched plants, 77% for irrigated and non-mulched plants, 63% for non-irrigated and mulched plants, and 8% for non-irrigated and non-mulched plants. In Year 3, the sample sizes of non-irrigated and mulched plants (n=8) and non-irrigated and non-mulched plants (n=26) are small. When irrigation is unavailable, results suggest that mulch increases survivorship. Non-irrigated and mulched plant survivorship was 63% by Year 3, whereas non-irrigated and non-mulched plant survivorship was 8%.

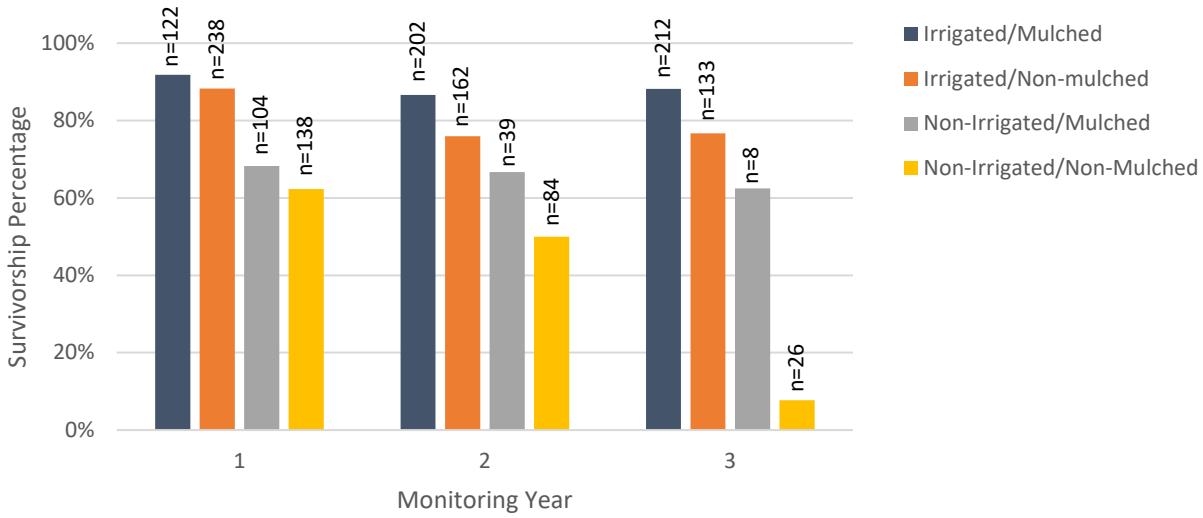

Figure 4. Survivorship Percentage Evaluating the Use of Irrigation and Mulch of Plants at HA 26 by Monitoring Year. By Year 3, the sample sizes of Non-Irrigated/Mulch (n=8) and Non-Irrigated/No Mulch (n=26) are small.

RECOMMENDATIONS

Irrigation is recommended for future use at other sites to accelerate native plant establishment and growth, especially sites where plants seem to be stunted. Irrigation is recommended at places with low risk of theft, easily accessibility for water deliveries, the need for quicker plant establishment, and poor native vegetation surrounding the site. Mulch appeared to be an important factor at HA 26 as well. Mulch may help by adding organic material to denuded soil, increasing water retention in the soil, and reducing the risk of erosion that can be caused by the irrigation system. The use of mulch is recommended when available.