

2020 ANNUAL REPORT
FORMER FORT ORD SITE 39 HABITAT RESTORATION
CONTRACT NO. W91238-18-D-0007
TASK ORDER W9123818F0072

FORMER FORT ORD



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May 2021



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APPENDICES

Appendix A - Seed and Plant Tables

Appendix B - Restoration Activities

Appendix C - Photo Log

Appendix D - Photo Points

Appendix E - Photo Points Time Lapse Series for HAs in Year 5

Appendix F - Photo Points Time Lapse Series for HAs in Year 8

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
CDEC	California Data Exchange Center
CTS	California Tiger Salamander
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
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
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

SPECIES LIST AND CODES

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

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

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

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

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

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

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

Scientific Name	Common Name	Code	Category
<i>Sonchus</i> sp.	sow thistle	SO	NNF
<i>Spergularia rubra</i>	red sand-spurrey	SPRU	NNF
<i>Spergularia villosa</i>	hairy sand-spurrey	SPVI	NNP
<i>Stachys ajugoides</i>	bugle hedge-nettle	STAJ	NP
<i>Stachys bullata</i>	wood mint	STBU	NP
<i>Stipa cernua</i>	nodding needle grass	STCE	NP
<i>Stipa pulchra</i>	purple needle grass	STPU	NP
<i>Stipa</i> sp.	needle grass	ST	NP
<i>Stylocline gnaphaloides</i>	everlasting neststraw	STGN	NF
<i>Symphoricarpos albus</i> var. <i>laevigatus</i>	common snowberry	SYALL	NP
<i>Taraxia ovata</i>	sun cup	TAOV	NP
<i>Thysanocarpus laciniatus</i>	narrow leaved fringe pod	THLA	NF
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP
<i>Trifolium albopurpureum</i>	rancheria clover	TRAL	NF
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN	NNF
<i>Trifolium campestre</i>	hop clover	TRCA	NNF
<i>Trifolium depauperatum</i> var. <i>truncatum</i>	truncate sack clover	TRDET	NF
<i>Trifolium dubium</i>	little hop clover	TRDU	NNF
<i>Trifolium gracilentum</i>	pinpoint clover	TRGR	NF
<i>Trifolium hirtum</i>	rose clover	TRHI	NNF
<i>Trifolium macraei</i>	Macrae's clover	TRMA	NF
<i>Trifolium microcephalum</i>	small-head clover	TRMI	NF
<i>Trifolium</i> sp.	clover	TR	
<i>Trifolium willdenovii</i>	tomcat clover	TRWI	NF
<i>Triglochin scilloides</i>	flowering-quillwort	TRSC	NF
<i>Triphysaria pusilla</i>	dwarf owl's clover	TRPU	NF
<i>Triteleia ixioides</i>	pretty face	TRIX	NP
<i>Uropappus lindleyi</i>	silver puffs	URLI	NF
<i>Verbena bracteata</i>	bracted verbena	VEBR	NP
<i>Verbena lasiostachys</i> var. <i>lasiostachys</i>	western vervain	VELAL	NP
<i>Vicia americana</i> ssp. <i>americana</i>	American vetch	VIAMA	NP
<i>Vicia benghalensis</i>	purple vetch	VIBE	NNF
<i>Vicia hassei</i>	slender vetch	VIHA	NF
<i>Vicia ludoviciana</i> ssp. <i>ludoviciana</i>	slender vetch	VILUL	NF
<i>Vicia sativa</i>	spring vetch	VISA	NNF
<i>Vicia sativa</i> ssp. <i>nigra</i>	narrow-leaved vetch	VISAN	NNF
<i>Vicia</i> sp.	vetch	VI	
<i>Xanthium strumarium</i>	rough cocklebur	XAST	NF
<i>Zeltnera davyi</i>	Davy's centaury	ZEDA	NF

* HMP species

NP = Native Perennial (Shrubs and Perennial Herbs/Forbs)

NF = Native Forb (Annual Herbs/Forbs)

NNP = Non-Native Perennial

NNF = Non-Native Forb

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1. INTRODUCTION

Burleson Consulting Inc. (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 restoration activities completed from December 2019 through December 2020 as well as a progress summary for each Historic Area (HA) and recommendations for future adaptive management.

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. Of the 19 HAs, 15 have received their full SSRP restoration prescription and are in a monitoring phase. Three of the sites have received more than half their SSRP prescription and one site has not received any restoration to date. This annual report details tasks involved with the execution of habitat restoration on Site 39 in 2020, a progress summary for each HA, and recommendations when altered restoration or monitoring tactics are required.

Work performed in 2020 consisted of:

- Storage of previously collected plant material
- Propagating collected plant material
- Restoration activities at HAs 18, 19, 26, 33, 34, 36, 37, 38 and 43
- Erosion control repairs at HAs 19, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 39/40, 43, and 44
- Monitoring restoration sites to evaluate vegetative establishment
- Irrigation at HA 26

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 and are ongoing. By the end of the 2020 calendar year, approximately 60 acres were seeded (passive restoration) and about 57,814 plants were installed (active restoration). Of the 19 restoration sites, 15 received their full SSRP restoration prescription and were in a monitoring phase (see Figure 1-1). Three of the sites received more than half their SSRP restoration prescription and one site has not received any restoration to date.

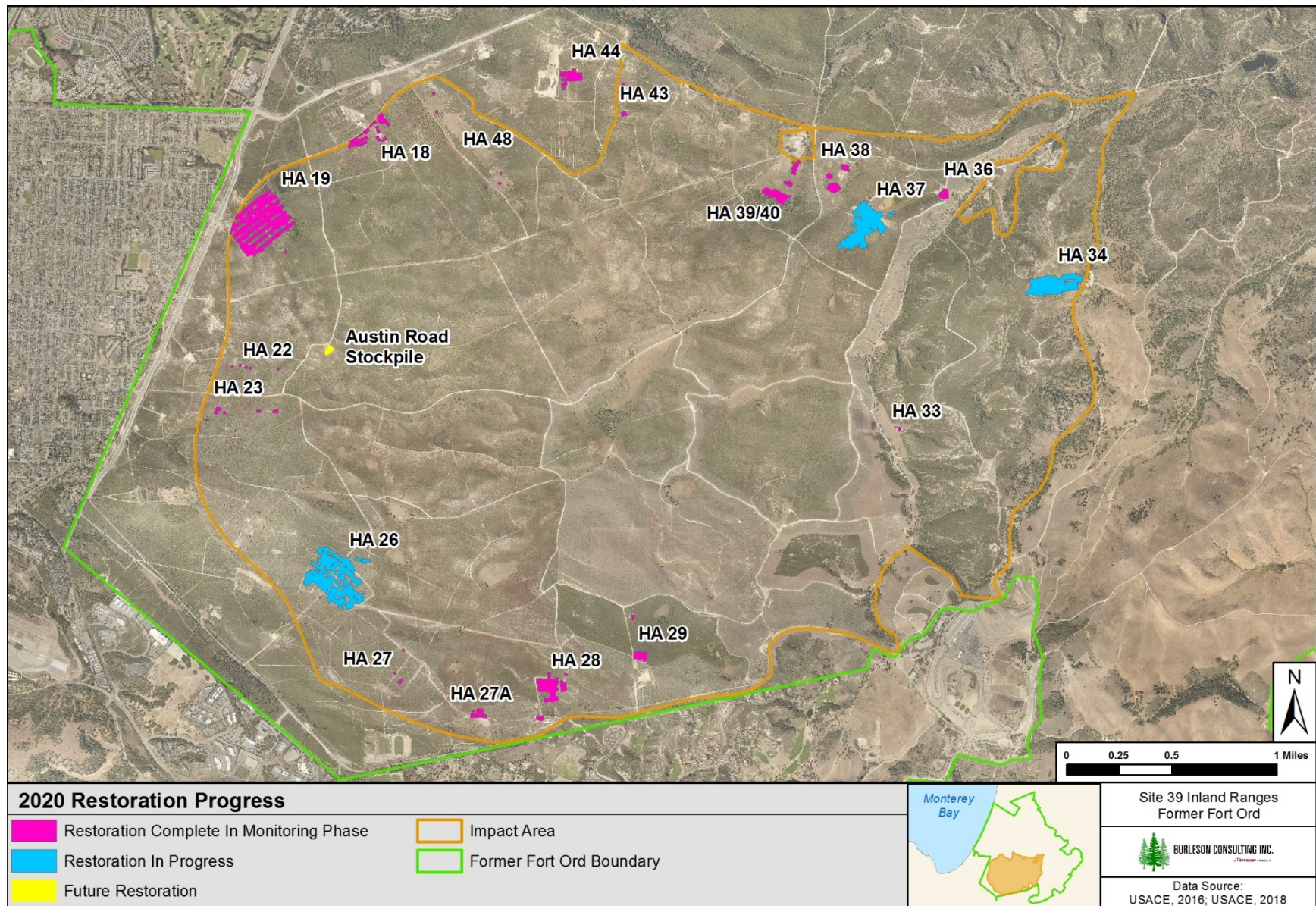


Figure 1-1. Restoration Progress Map

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2. RESTORATION PROTOCOLS AND SITE-SPECIFIC RESTORATION PLANS

Burleson developed the Propagation Protocol and SSRPs for each HA that detail quantities and types of plant material to be collected for former Fort Ord (Burleson, 2010; Burleson, 2013). These protocols contain detailed information on specific plant salvage and propagation techniques to be followed by field crews. Additionally, S&S Seeds supported Burleson with seed production as discussed in Section 3.1.

Following the Propagation Protocol, field crews collected Habitat Management Plan (HMP) species within a 1-kilometer radius centered on each HA (Burleson, 2010). Common species were collected within a 10-mile radius of each HA. Collected seeds were processed manually to remove residual hull, stems, leaves, and chaff, to the extent possible. Seed weight totals were entered into the seed inventory database once processing was complete.

Collected plant material was stored at Burleson's native plant nursery in Carmel Valley in a cool, dry location until ready to be processed. Labeling and tracking of all plant material followed the Propagation Protocol (Burleson, 2010). Burleson biologists maintained a spreadsheet database so that plant and seed inventories were 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 ft 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, October, and December of 2020 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-5 in Appendix C illustrate pear test results.

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3. SEED COLLECTION

In 2020, 3.05 acres-worth of seed was collected for HAs 26, 34, 37, 38, and 43 (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 1 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 2020, including the sky lupine (*Lupinus nanus*) target missed in 2019 due to limited seed availability. One exception was the sand gilia (*Gilia tenuiflora* ssp. *arenaria*) target at HA 38. The seed expected from propagated sand gilia was not mature in time for broadcast. Photographs C-6 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 deerweed (*Acmispon glaber*). The 2020 production seed yield of deerweed is presented in Table 3-1. The total 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. 2020 Production Plot Seed Yield

Species	Bulk Seed (lb)	Pure Live Seed (lb)
<i>Acmispon glaber</i> (deerweed)	137.96	40.31

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 three production species are presented in Table A-3, Appendix A. The deerweed plot will be continued, the purple needle grass (*Stipa pulchra*) plot was replanted in 2020, and the common yarrow (*Achillea millefolium*) and blue wild-rye (*Elymus glaucus*) plots have been discontinued.

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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 15 common and HMP species used in active restoration (Burleson, 2010). The total 2020 SSRP plant quantity targets, 2,495 plants for HAs 26 and 37, were achieved. The 2020 Adaptive Management Plan (AMP) plant quantity targets totaling 1,412 plants were achieved for HAs 18, 19, 33, and 36.

To meet SSRP targets overall, suitable surplus plants were used to supplement targets for deficient species. All substitutions were approved by USACE. See Table A-4 and A-5 in Appendix A for final plant inventories for HAs 26, 27A North, 27A South, 29, 34, 37, 38, and 39/40. Photographs C-17 through C-29 in Appendix C illustrate various aspects of plant propagation.

4.1 Nursery Evacuation

On Friday, August 21, at 3:39 p.m. there was an Evacuation Warning announcement issued by Monterey County Office of Emergency Services due to the Carmel and River Fires. The Evacuation Warning included the area where Burleson's nursery is located in Carmel Valley. Burleson immediately executed the emergency wildfire response to shut down and evacuate the nursery highlighted in Sections 8.2.4, 8.2.4.1, and 8.2.4.2 of the Accident Prevention Plan (Burleson, 2019b). Ten Burleson staff and five volunteers temporarily relocated the U.S. Army assets from the Burleson nursery to the Joe Lloyd Way yard. All gallon and deepot container plants and as many cone trays as possible were moved totaling approximately 8,000 plants. On Saturday morning, August 22, the Evacuation Warning was upgraded to an Evacuation Order and on Monday, August 24, the Evacuation Order was lifted. The plants remained at the Joe Lloyd Way yard until November 9 when they were moved back to the Burleson nursery after the first rain events signaled the end of fire season. Photographs C-30 through C-36 in Appendix C show the evacuation of Burleson's native plant nursery.

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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 under this contract included passive restoration at HAs 26, 34, 37, 38, and 43 and active restoration at HAs 18, 19, 26, 33, 36, and 37.

5.1 Passive Restoration

Table 5-1 summarizes 2020 passive restoration activities. Generally, passive restoration activities occur annually between October and February, spanning two calendar years, and do not include production seed utilized for erosion control. This report focuses on restoration activities completed within the 2020 calendar year. In late 2020, Burleson performed passive restoration at HAs 26, 34, 37, 38, and 43. Appendix B provides detailed seed quantities, lists of species applied, and seed application locations for each restoration site. The following sections provide a description of passive restoration activities at each HA.

Table 5-1. 2020 Summary of Passive Restoration Activities per HA

HA	Passive Restoration Activities
26	Broadcast 1.0 acre-worth [†] of SSRP seed mix, enhanced with production seed, and 0.21 lb of Monterey spineflower*
34	Broadcast 1.25 acre-worth [†] of SSRP seed mix, enhanced with production seed
37	Broadcast 0.8 acre-worth [†] of SSRP seed mix, enhanced with production seed, and 1.04 lb of Monterey spineflower*
38	Broadcast 0.15 lb of seaside bird's beak* and 0.058 lb of sand gilia*
43	Broadcast 0.001 lb of sand gilia*

[†] Acre-worth of seed = amount of seed prescribed to restore 1 acre of area in accordance with the SSRP

* HMP Species

5.1.1 HA 26 Passive Restoration Activities

In December 2020, Burleson applied 1.0 acre-worth of SSRP seed mix, enhanced with production seed mix, over 1.0 acre at HA 26 (see Appendix B Figure B-3, Tables B-3). The seed was applied to a 1.0-acre portion of the passive restoration area. Photographs C-38 and C-39, Appendix C show restoration efforts at HA 26.

In December 2020, Burleson applied 0.21 lb of Monterey spineflower (*Chorizanthe pungens* var. *pungens*) in one previously established broadcast plot totaling 0.03 acre at HA 26 (see Appendix B Figure B-1, Table B-5). Photograph C-37, Appendix C shows Monterey spineflower broadcast efforts at HA 26.

5.1.2 HA 34 Passive Restoration Activities

In December 2020, Burleson applied 1.25 acres-worth of SSRP seed mix, enhanced with production seed mix, over 1.25 acres at HA 34 (see Appendix B Figure B-9, Table B-11). The seed was applied to a 1.25-acres portion of the site. Photographs C-40 through C-43, Appendix C show restoration efforts at HA 34.

5.1.3 HA 37 Passive Restoration Activities

In December 2020, Burleson applied 0.80 acre-worth of SSRP seed mix, enhanced with production seed mix, over 0.80 acre at HA 37 (see Appendix B Figure B-11, Tables B-15). The seed was applied over the

former access roads and a section of the site in between the former access roads. Photographs C-44 and C-45, Appendix C show restoration efforts at HA 37.

In December 2020, Burleson applied 1.04 lbs of Monterey spineflower in all four previously established broadcast plots totaling 0.21 acre at HA 37 (see Appendix B Figure B-11, Table B-17).

5.1.4 HA 38 Passive Restoration Activities

In December 2020, Burleson applied 0.15 lb of seaside bird's beak (*Cordylanthus rigidus* ssp. *littoralis*) in one newly established broadcast plot totaling 0.06 acre at HA 38 (see Appendix B Figure B-12, Table B-19). Additionally, Burleson applied 0.058 lb of sand gilia in all four previously established broadcast plots and one newly established broadcast plot totaling 0.02 acre at HA 38 (see Appendix B Figure B-12, Table B-18). Photographs C-46 through C-49, Appendix C show restoration efforts at HA 38.

5.1.5 HA 43 Passive Restoration Activities

In December 2020, Burleson applied 0.001 lb of sand gilia in the previously established broadcast plot totaling 0.001 acre at HA 43 (see Appendix B Figure B-14, Table B-22). Photographs C-50 and C-51, Appendix C show restoration efforts at HA 43.

5.2 Active Restoration

Table 5-2 summarizes 2020 active restoration activities at each site. Burleson installed a total of 3,907 plants at HAs 18, 19, 26, 33, 36, and 37 in late 2019 and early 2020. SSRP planting took place at HAs 26 and 37. Adaptive Management Plan activities occurred at HAs 18, 19, 33, and 36 to supplement sites that did not meet success criteria in 2019. Tables B-24 through B-29 in Appendix B provide detailed information on the species and quantities planted at each HA.

Table 5-2. 2020 Summary of Active Restoration Activities per Historic Area

HA	Active Restoration Activities
18	Installed 188 plants
19	Installed 400 plants
26	Installed 1,727 plants (1.0 acre in Target Area 1)
33	Installed 115 plants
36	Installed 709 plants
37	Installed 768 plants (0.5 acre on former access roads)

5.2.1 HA 18 Active Restoration Activities

In January and February 2020, Burleson installed 188 plants across 1.4 acres at HA 18. Plants were installed evenly throughout barren areas and areas with dense vegetation were avoided. Figure B-16 in Appendix B shows the location of planted areas and Table B-24 lists installed species and quantities. Photograph C-52 in Appendix C shows AMP planting efforts.

5.2.2 HA 19 Active Restoration Activities

In January 2020, Burleson installed 400 plants across 14 acres at HA 19. Plants were installed evenly throughout barren areas and areas with dense vegetation were avoided. Figure B-17 in Appendix B shows the location of planted areas and Table B-25 lists installed species and quantities. Photographs C-53 and C-54 in Appendix C shows AMP planting efforts.

5.2.3 HA 26 Active Restoration Activities

Burleson installed 1,727 plants across 1.6 acres in Target Area 1 at HA 26 in December 2019 and January 2020. Unexploded Ordnance (UXO) escorts did not accompany Burleson biologists during plant installation because Target Area 1 was cleared to depth. A portion of the site was covered in mulch from erosion control measures conducted by Kemron Environmental Services, Inc. (Kemron). Large plants were installed in mulched areas to increase survivorship. Barren areas were planted more densely than areas with good natural recruitment. Figure B-18 in Appendix B shows the location of planted areas and Table B-26 lists installed species and quantities. Photograph C-55 in Appendix C represent plant installation at HA 26. Additional planting is required to fulfill the SSRP planting targets for this site.

5.2.4 HA 33 Active Restoration Activities

In January 2020, Burleson installed 115 plants across 0.01 acre at HA 33. Plants were installed evenly throughout barren areas and areas with dense vegetation were avoided. Figure B-19 in Appendix B shows the location of planted areas and Table B-27 lists installed species and quantities. Photograph C-56 in Appendix C shows AMP planting efforts.

5.2.5 HA 36 Active Restoration Activities

In January and February 2020, Burleson installed 709 plants over 0.5 acres at HA 36. Barren areas were planted more densely than areas with good natural recruitment. Figure B-20 in Appendix B shows the location of planted areas and Table B-28 lists installed species and quantities. Photos C-57 through C-59 in Appendix C demonstrate plant installation at HA 36.

5.2.6 HA 37 Active Restoration Activities

Burleson installed 768 plants across 0.5 acre at HA 37 in December 2019 and January 2020. Plants were installed evenly throughout barren areas and areas with dense vegetation were avoided. Figure B-21 in Appendix B shows the location of planted areas and Table B-29 lists installed species and quantities. Photos C-60 through C-62 in Appendix C represent plant installation at HA 26. Additional planting is required to fulfill the SSRP planting targets for this site.

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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 2020. 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, 2009). Monitoring activities conducted in 2020 are summarized in Table 6-1 by HA. Section 6.1 describes methods for monitoring activities. Monitoring results for 2020 are presented in Section 9 on a site-by-site basis. Photographs C-63 through C-67 in Appendix C illustrate various monitoring tasks.

Table 6-1. 2020 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

6.1.1 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. Additionally, photo documentation of restoration activities occurred throughout the year. See Appendix C for a photo log of 2020 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 2020, and Appendix F for photos illustrating restoration progress of HAs in year 8 of monitoring in 2020.

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

Plot density surveys for HMP annuals (Monterey spineflower, sand gilia, and seaside bird's beak) 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 1 acre in size, density may be obtained by sub-sampling the population with circle plot surveys as described in the Monitoring Protocol (Burleson, 2009). Circle plot data were analyzed in ArcMap using the interpolation tool to develop an HMP annual density model.

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 will be 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 (Burlison, 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 was not compared to the 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 (Burlison, 2009). 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 HA 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

In early 2020, Burleson conducted wet season erosion control repairs at HA 34. In late 2020, Burleson completed repairs at HAs 28, 34, and 36 and production seed broadcast at HAs 19, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 39/40, 43, and 44. 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-68 through C-76 in Appendix C document erosion control field activities. The following work was performed in 2020:

HA 19

- November 2020
 - Broadcast production seed mix over 1.0 acre
 - Broadcast and crimped straw mulch on 1.0 acre

HA 23

- November 2020
 - Broadcast production seed mix over 0.2 acre
 - Broadcast and crimped straw mulch on 0.2 acre

HA 26

- December 2020
 - Broadcast production seed mix over 4.15 acres
 - Broadcast and crimped straw mulch on 4.15 acres

HA 27

- November 2020
 - Broadcast production seed mix over 0.05 acre
 - Broadcast and crimped straw mulch on 0.05 acre

HA 27A

- November 2020
 - Broadcast production seed mix over 0.25 acre
 - Broadcast and crimped straw mulch on 0.25 acre

HA 28

- August - September 2020
 - Collapsed approximately 15 linear feet of rill erosion averaging 6" wide and 12" deep
 - Installed 100 linear feet of straw wattles
 - Broadcast production seed mix over 0.6 acre
 - Broadcast and crimped straw mulch on 0.5 acre
- December 2020
 - Broadcast production seed mix over 2.0 acres
 - Broadcast and crimped straw mulch on 2.0 acres

HA 29

- November 2020
 - Broadcast production seed mix over 0.5 acre
 - Broadcast and crimped straw mulch on 0.5 acre

HA 33

- December 2020
 - Broadcast production seed mix over 0.05 acre
 - Broadcast and crimped straw mulch on 0.05 acre
 - Applied 100 lb of Biosol fertilizer (excluding HMP restoration plot and 10 ft buffer)

HA 34

- January – February 2020
 - Collapsed approximately 55 linear feet of rill erosion averaging 6" wide by 12" deep
 - Installed 775 linear feet of straw wattles
 - Broadcast erosion control seed mix over 0.1 acre
 - Broadcast production seed mix over 0.25 acre
 - Broadcast and crimped straw mulch on 0.25 acre
- September 2020
 - Collapsed approximately 240 linear feet of rill erosion averaging 6" wide by 12" deep
 - Installed 825 linear feet of straw wattles
 - Broadcast production seed mix over 0.4 acre
 - Broadcast and crimped straw mulch on 0.4 acre
- November 2020
 - Broadcast production seed mix over 0.5 acre
 - Broadcast and crimped straw mulch on 0.5 acre
 - Monitored and maintained water bars

HA 36

- September 2020
 - Collapsed approximately 30 linear feet of rill erosion averaging 6" wide by 12" deep
 - Installed 250 linear feet of straw wattles
 - Broadcast production seed mix over 0.2 acre
 - Broadcast and crimped straw mulch on 0.2 acre
- December 2020
 - Broadcast production seed mix over 0.5 acre
 - Broadcast and crimped straw mulch on 0.5 acre
 - Established 0.1 acre test plot for Biosol fertilizer
 - Applied 300 lb of Biosol to test plot

HA 37

- December 2020
 - Broadcast production seed mix over 2.0 acres
 - Broadcast and crimped straw mulch on 2.0 acres

HA 39/40

- December 2020
 - Broadcast production seed mix over 2.0 acres
 - Broadcast and crimped straw mulch on 2.0 acres

HA 43

- November 2020
 - Broadcast production seed mix over 0.1 acre
 - Broadcast and crimped straw mulch on 0.1 acre

HA 44

- November 2020
 - Broadcast production seed mix over 0.5 acre
 - Broadcast and crimped straw mulch on 0.5 acre

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8. IRRIGATION

Burleson maintained and operated a 6,000-gallon capacity irrigation system with 3,500 emitters to irrigate active restoration areas at HA 26. Ten irrigation events occurred between May and December 2020; approximately two to three gallons were delivered to each plant per irrigation event. Maintenance of the system included repairing a leak in the mainline, repairing spaghetti lines due to damage from wildlife, cleaning buried emitters, replacing malfunctioning emitters, cleaning the water filter, repainting the PVC to reduce UV damage, and sealing leaky connections with liquid electrical tape.

The 3,500 emitters were staked at the base of the following shrub species:

- chamise (*Adenostoma fasciculatum*)
- sandmat manzanita (*Arctostaphylos pumila*)
- shaggy-bark manzanita (*Arctostaphylos tomentosa*)
- coyote brush (*Baccharis pilularis*)
- Monterey ceanothus (*Ceanothus rigidus*)
- Eastwood's goldenbush (*Ericameria fasciculata*)
- black sage (*Salvia mellifera*)

Burleson obtained water from Sala Brothers Water Trucking to support irrigation water needs. Table 8-1 provides specific details regarding irrigation events at HA 26. To promote plant establishment and growth, irrigation events occurred in the dry season. Figure 8-1 shows irrigation events in relation to daily precipitation in 2020. Photographs C-77 through C-85 in Appendix C show the status of the irrigated plants and the system.

Table 8-1. Irrigation Events at HA 26

Irrigation Event	Date	Gallons
1	May 13 and 14, 2020	9,000
2	June 3 and 4, 2020	9,000
3	June 23 and 25, 2020	7,000
4	July 15 and 16, 2020	9,800
5	August 5 and 6, 2020	9,800
6	August 26 and 27, 2020	9,000
7	September 16 and 17, 2020	9,000
8	October 7 and 8, 2020	9,000
9	October 27 and 28, 2020	9,000
10	December 8 and 10, 2020	9,000

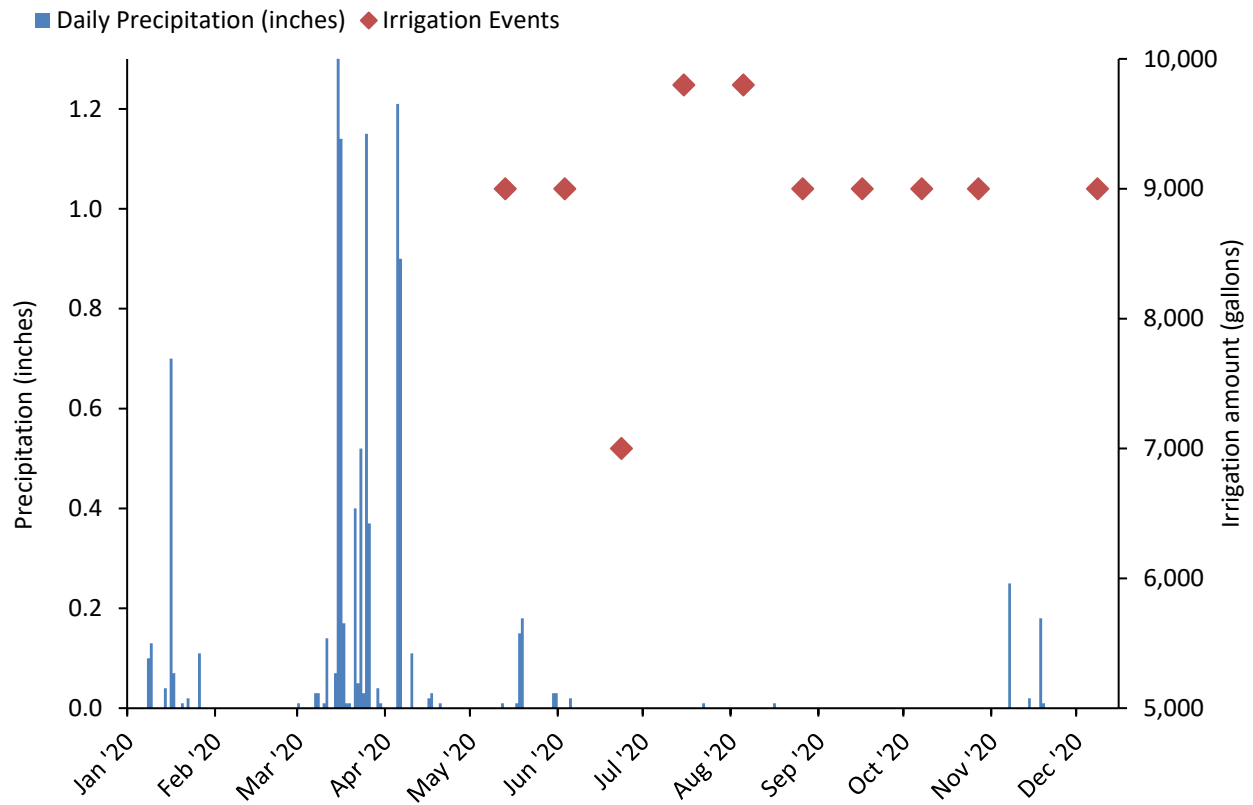


Figure 8-1. Daily Precipitation and Irrigation Events for 2020 (CDEC, 2020)

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 the restoration effort through 2020, 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 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, and 2019 and monitoring began in 2013. The HA was monitored for ten 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. 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	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2025
Restoration: Active, Passive, and Erosion Control	●	●							●		
Photo Points and Site Visit*	●	●	●	●	●	●	●	●	●	●	●
Monterey Spineflower Plots			●	●	●	●	●	●		●	
HMP Annual Density across HA						●	●	●		●	
Species Richness						●	●	●		●	●
Vegetative Cover						●	●	●		●	●

* Photo points and site visits occur every year regardless of the monitoring year

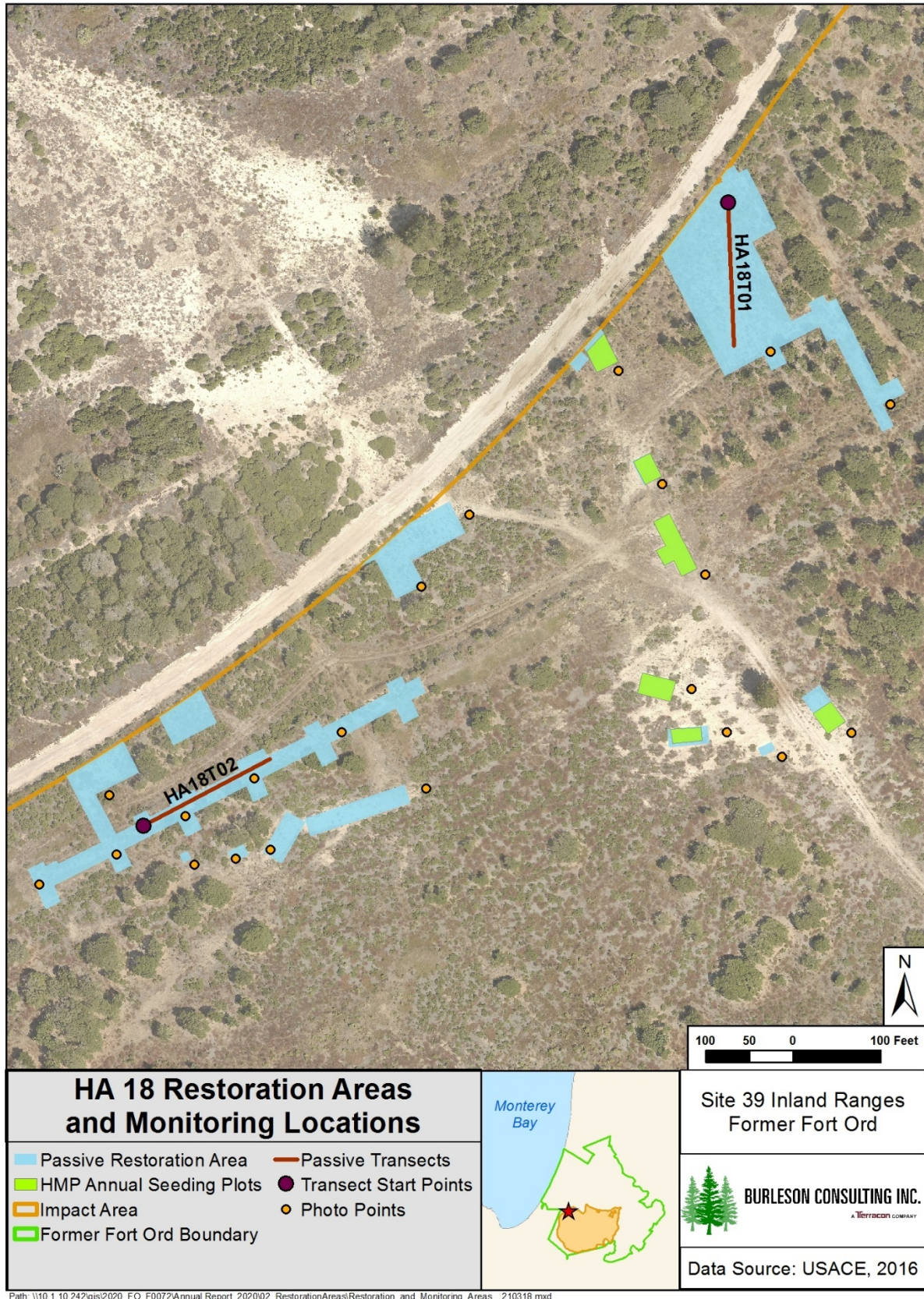


Figure 9-1. HA 18 Restoration Areas and Monitoring Locations Map

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
		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 2020. 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.

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). A total of 228 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	Total by Species
ADFA	40	-	40
ARPU*	-	84	84
CERI*	-	55	55
ERFA*	-	49	49
TOTAL	40	188	228

*HMP species

9.1.2 Monitoring Results

9.1.2.1 HMP Annual Density

Six Monterey spineflower plots were surveyed for year 8 density at HA 18 in 2020. The plots are numbered 1-6 on Figure 9-3 and are located throughout the site. Monterey spineflower density was high at Plots 1, 2, 3, and 6 and low at Plots 4 and 5. Figure 9-2 summarizes all the Monterey spineflower restoration plot densities for HA 18.

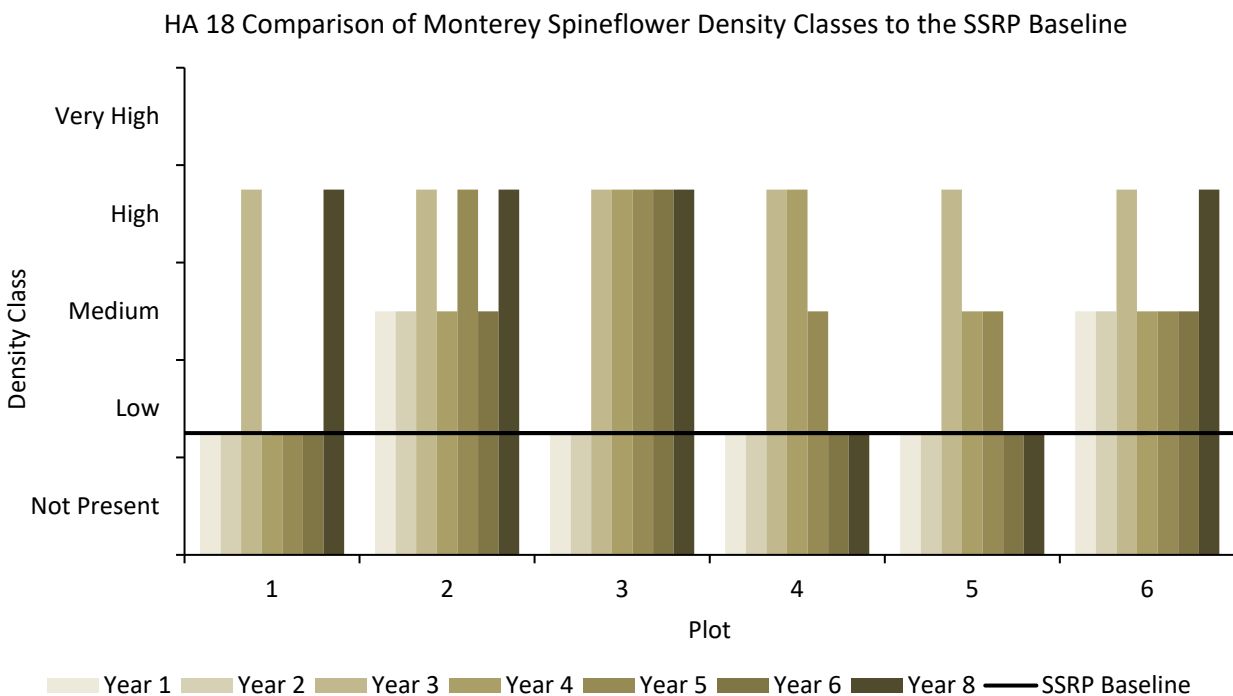


Figure 9-2. HA 18 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-6

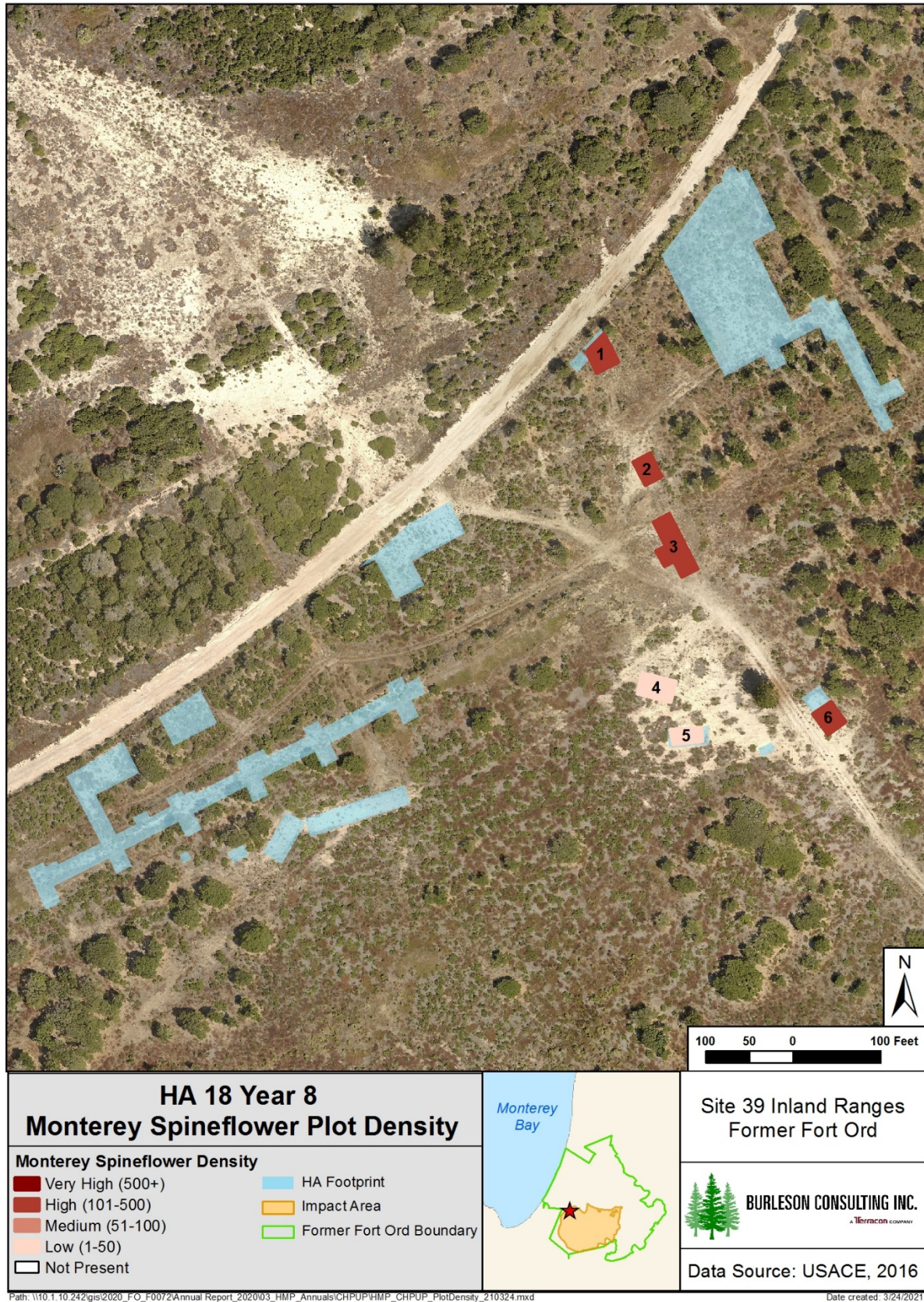


Figure 9-3. HA 18 Year 8 Monterey Spineflower Plot Density Map

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 Monterey spineflower at HA 18.

One hundred ninety-three individual plants and ten discrete patches of Monterey spineflower were mapped and individual plants were counted within each patch (see Figure 9-4). 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 0.25 acre. From 2018 to 2020, the density range remained the same and acreage above the SSRP baseline increased.

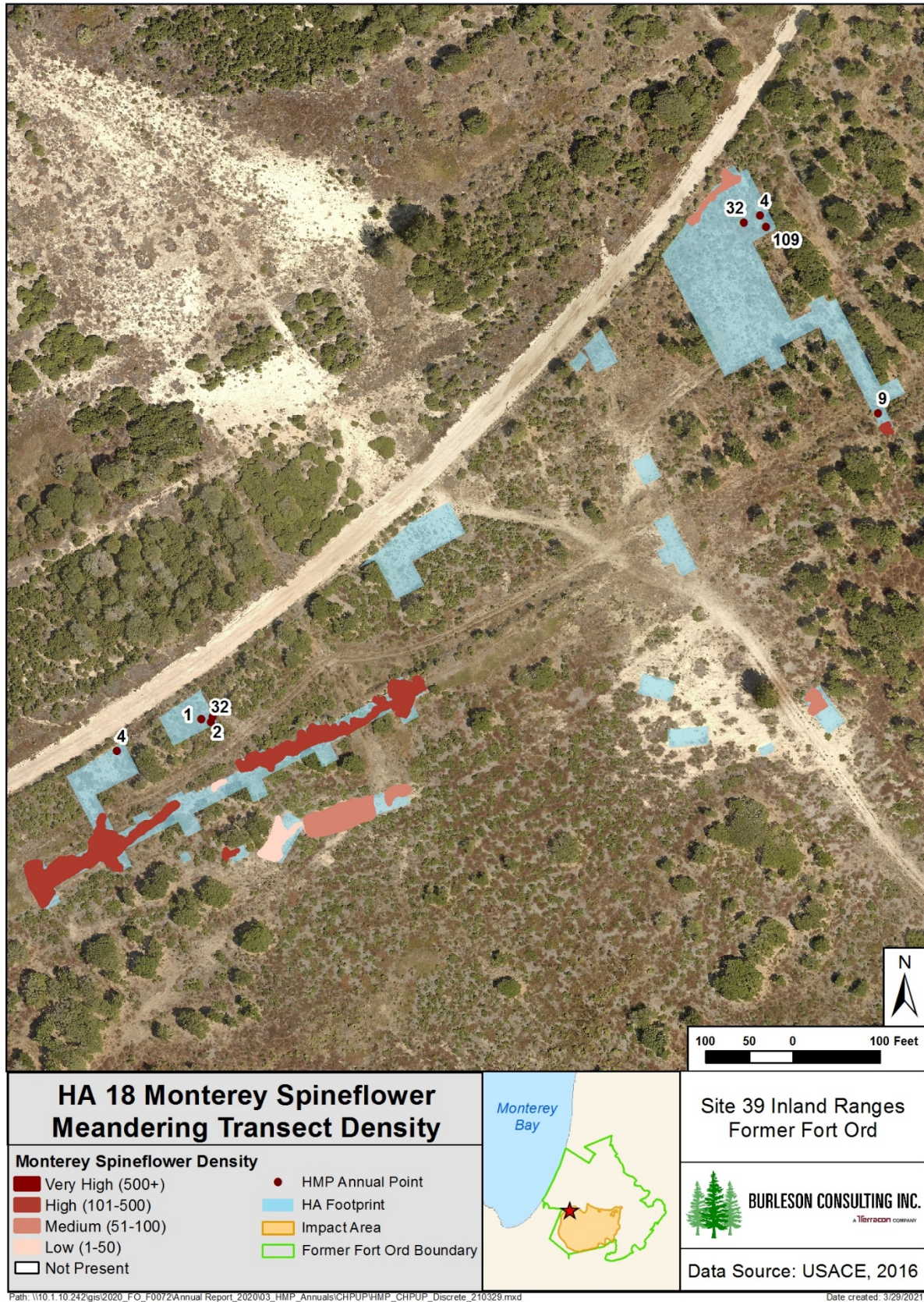


Figure 9-4. HA 18 Monterey Spineflower Meandering Transect Density Map

9.1.2.2 Plant Survivorship

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

9.1.2.3 Species Richness

Forty-seven species were observed at HA 18. Of those, 29 were native shrubs or perennials, seven were native annual herbaceous species, and 11 were non-native species (see Table 9-5). Species richness decreased by 33 species since 2018. Native shrub and perennial species decreased by eight, native herbaceous species decreased by 15, non-native species decreased by ten, and there were no uncategorized species.

Table 9-5. Species Observed at HA 18, 2020

Scientific Name	Common Name	Code	Category
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophylla</i>	silver hair grass	AICA	NNF
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Artemisia californica</i>	California sagebrush	ARCA	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Cardionema ramosissimum</i>	sand mat	CARA	NP
<i>Carex sp.</i>	sedge	CA	NP
<i>Castilleja densiflora</i>	owl's clover	CADE	NF
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Drymocallis glandulosa</i> var. <i>wrangelliana</i>	sticky cinquefoil	DRGLW	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI	NNF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Madia gracilis</i>	slender tarweed	MAGR	NF
<i>Nemophila menziesii</i>	baby blue eyes	NEME	NF
<i>Petrorhagia dubia</i>	hairypink	PEDU	NNF
<i>Pinus radiata</i>	Monterey pine	PIRA	NP
<i>Piperia sp.</i>	rein orchid	PI	NP

Table 9-5. Species Observed at HA 18, 2020

Scientific Name	Common Name	Code	Category
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Solanum umbelliferum</i>	blue witch	SOUM	NP
<i>Stachys bullata</i>	wood mint	STBU	NP
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP

* HMP species

9.1.2.4 Vegetative Cover

Burleson completed two 50-meter line-intercept transects at HA 18. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 61.32%. The mean vegetative cover by native shrubs and perennials was lower in 2020 than 2018 by 3.11%. Table 9-6 summarizes vegetative cover and Table 9-7 presents vegetative cover by species. Figure 9-5 presents the percent cover of dominant species at HA 26 in 2017, 2018, 2019, and 2020.

Table 9-6. Transect Survey Summary for HA 18

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA18T01	65.78	65.48	0.30	97.10	2.78
HA18T02	57.78	57.16	0.62	91.88	7.58
SITE AVERAGE	61.78	61.32	0.46	94.49	5.18

Table 9-7. Transect Survey Results for HA 18 by Species

Transect	ACGL (%)	AICA (%)	ARCA (%)	ARPU* (%)	ARTO (%)	BAPI (%)	CA (%)	CERI* (%)	CRSC (%)
HA18T01	21.04	0.00	0.70	3.28	16.12	3.34	0.38	0.00	0.00
HA18T02	33.58	0.62	0.00	3.26	13.52	0.00	0.00	0.20	4.04
SITE AVERAGE	27.31	0.31	0.35	3.27	14.82	1.67	0.19	0.10	2.02

Table 9-7 (continued). Transect Survey Results for HA 18 by Species

Transect	DIAU (%)	ERER (%)	ERFA* (%)	FEMY (%)	HOCU (%)	LUAR (%)	TODI (%)	TH (%)	BG (%)
HA18T01	1.26	0.00	1.52	0.30	0.76	2.48	14.60	97.10	2.78
HA18T02	1.00	0.92	0.00	0.00	0.64	0.00	0.00	91.88	7.58
SITE AVERAGE	1.13	0.46	0.76	0.15	0.70	1.24	7.30	94.49	5.18

* HMP Species

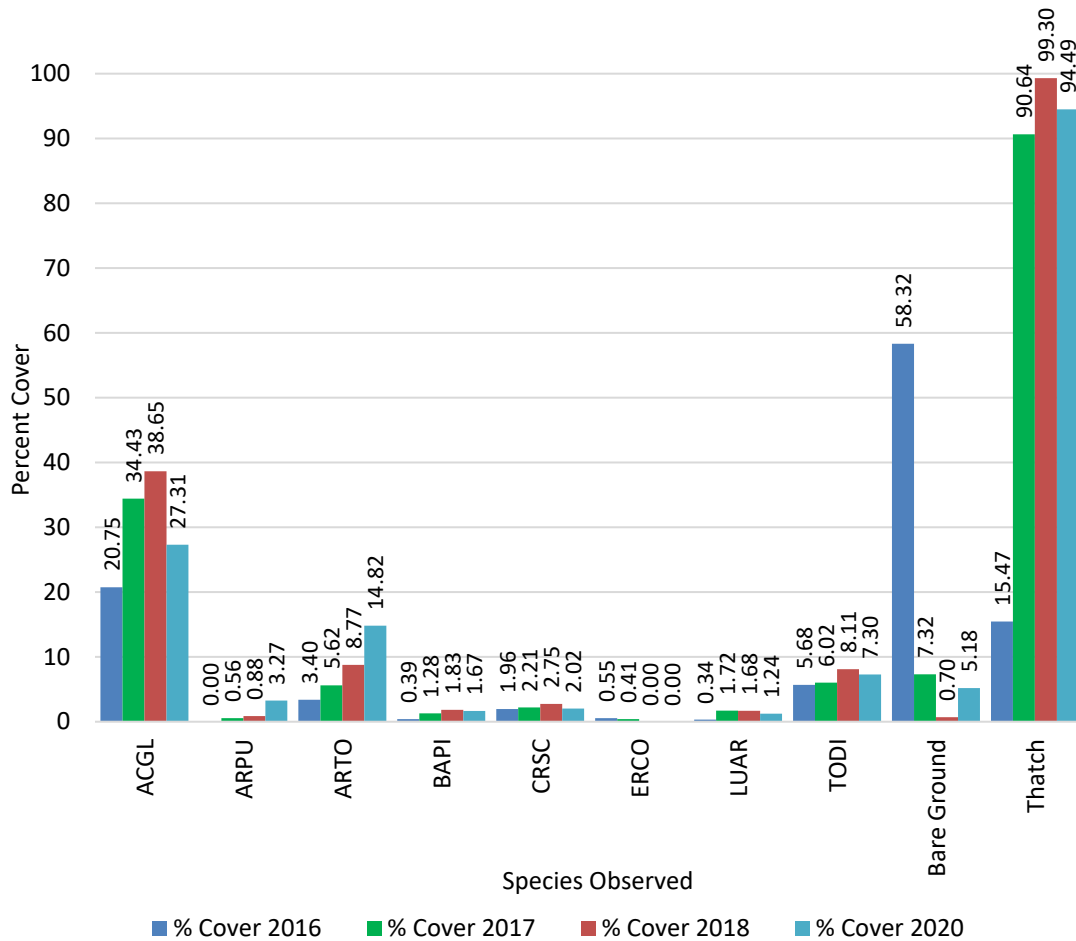


Figure 9-5. Percent Cover of Dominant Species at HA 18 in 2016, 2017, 2018, and 2020.

9.1.3 Discussion

9.1.3.1 Recommendations

HA 18 was in year 8 of monitoring in 2020. The site met four of six success criteria by 2020. Per recommendations in the 2017 Annual Habitat Restoration Report, chamise was planted in 2018/2019 to meet the species richness criterion and Monterey ceanothus was planted in 2019/2020 to support the HMP shrub cover criterion (Burleson, 2018). Additionally, the Army will plant dwarf ceanothus (*Ceanothus dentatus*) in 2021/2022 to meet the success criterion for species richness. An additional planting is recommended to assist the HMP shrub cover by species criterion of Monterey ceanothus. Overall, HA 18 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-1 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 monitoring year 13, 2025 (see Table 9-1). Table 9-8 summarizes the current status of HA 18 including which success criteria were met and recommendations.

Table 9-8. Status and Recommendations for Achieving Success Criteria at HA 18

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Plant dwarf ceanothus (scheduled 2021/2022)*
Objective 1 – No. 2	Native vegetation cover	Yes	None
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	No	Plant Monterey ceanothus†
Objective 3 – No. 4	HMP annual density	Yes	None

* Recommendation repeated from the 2018 Annual Habitat Restoration Report (Burleson, 2019a).

† Not scheduled

9.1.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 18. The SSRP baseline density class for Monterey spineflower was low. Year 8 Monterey spineflower restoration plot results show that densities met or exceeded the success criterion under Objective 3 for all plots. In addition, Monterey spineflower was present outside of the restoration plots. Discrete patches, with densities that either met or exceeded the success criterion, covered 0.25 acres of HA 18. This concludes HMP annual monitoring for Monterey spineflower at HA 18, the success criterion has been met.

9.1.3.3 Plant Survivorship

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

9.1.3.4 Species Richness

Chamise, shaggy-bark manzanita, California sagebrush (*Artemisia californica*), coyote brush, Monterey ceanothus, mock heather (*Ericameria ericoides*), Eastwood's goldenbush, golden yarrow (*Eriophyllum confertiflorum*), peak rush-rose (*Crocanthemum scoparium*), deerweed, sticky monkeyflower (*Diplacus aurantiacus*), coast live oak (*Quercus agrifolia*), and black sage were present. Dwarf ceanothus was not present. HA 18 included 29 native shrub and perennial species; however, the site did not meet the success criterion for Objective 1.

9.1.3.5 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 native shrub, perennial, and annual species presented in Table 2 of the HA 18 SSRP (Burleson, 2013). These species contributed 52.59% cover to the HA; therefore, this success criterion was met (see Figure 9-6).

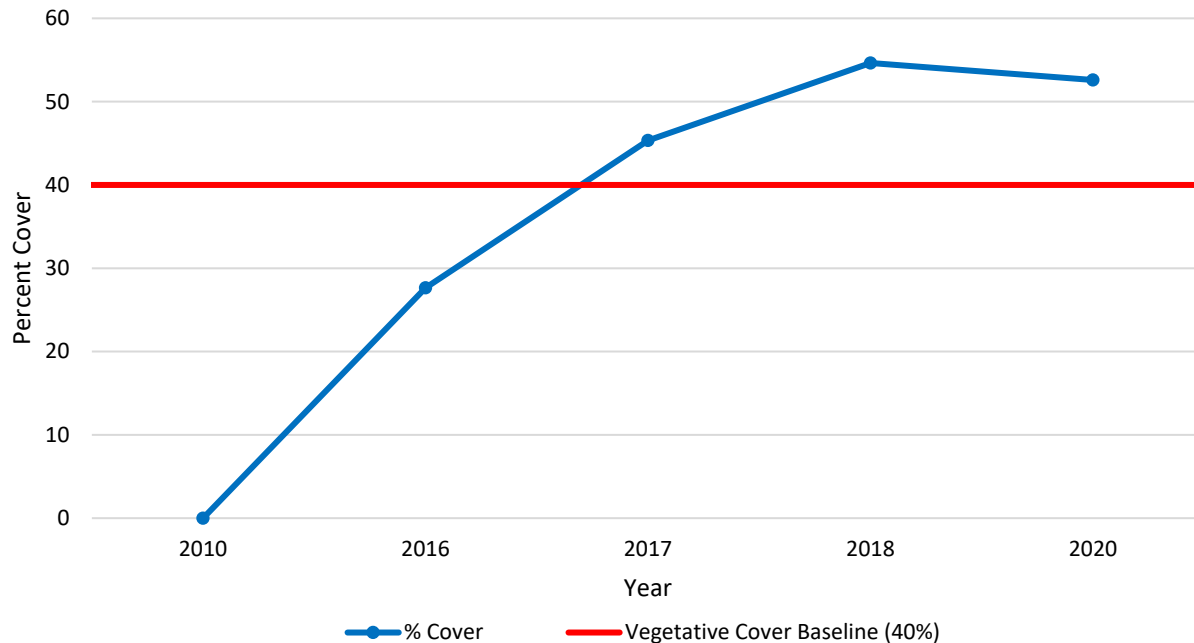


Figure 9-6. Native Vegetative Cover Compared to the Success Criterion at HA 18

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. There was a decrease of 1.52% from 2018. 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 18 provided an absolute cover of 4.13%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 18, this means a vegetative cover average of at least 4% cover for Monterey ceanothus, and sandmat manzanita and Eastwood's goldenbush must be present. The average vegetative cover for Monterey ceanothus was 0.10%, sandmat manzanita was 3.27%, and Eastwood's goldenbush was 0.76% (see Figure 9-7). Sandmat manzanita and Eastwood's goldenbush increased in cover from 2018 to 2020 and Monterey ceanothus remained the same. In 2020, two of the three species, sandmat manzanita and Eastwood's goldenbush, met the criterion. The success criterion was not met because Monterey ceanothus cover was less than 4% and only a few individuals are present on site.

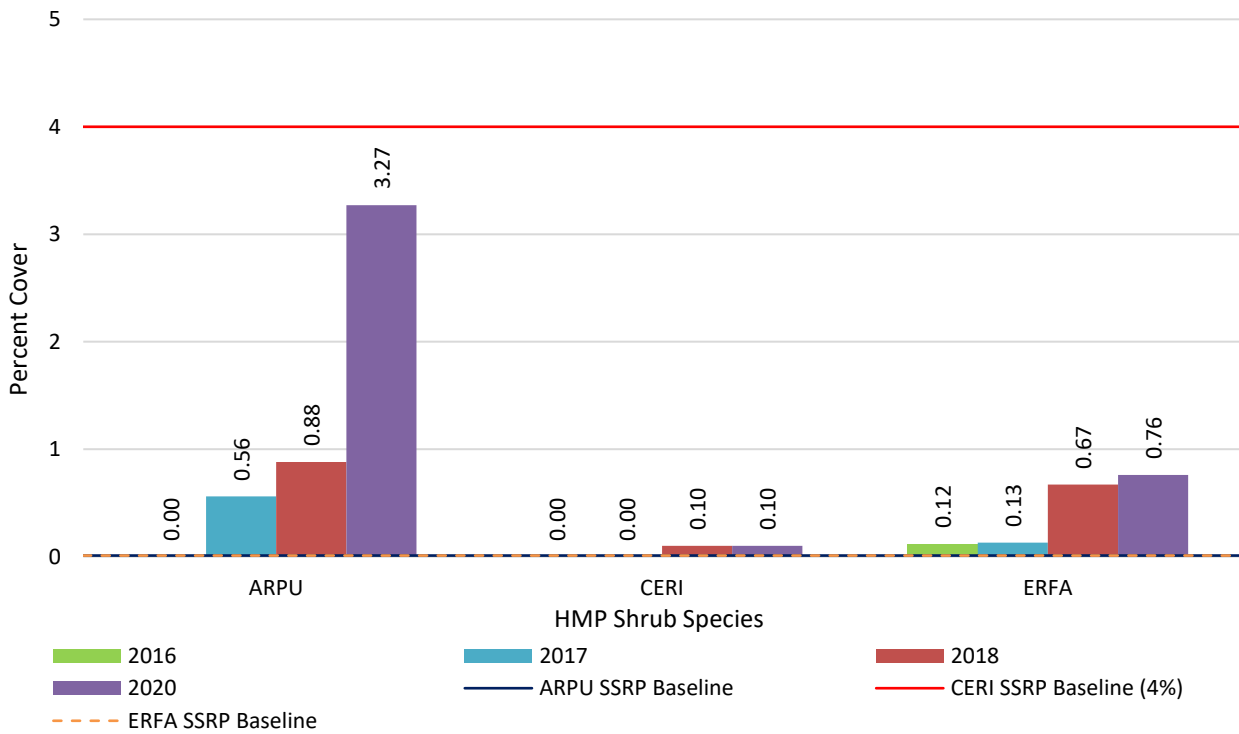


Figure 9-7. HMP Shrub Species Comparison to Success Criteria at HA 18

9.2 HA 19

HA 19 was used by the Army as a small-arm 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 activities at HA 19 began in 2012 and were completed in 2016. Monitoring at HA 19 began in 2013 and additional seed was broadcast in 2020. HA 19 was monitored for nine years by photo documentation and site visits, six years for HMP annual density in plots, four years for HMP annual density across the HA, three years for species richness and vegetative cover, and four years for plant survivorship (see Table 9-9). Figure 9-8 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 9-10.

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

Activity	Monitoring Years										
			1	2	3	4	5	6	7	8	13
	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	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		•	•	•	•						

* Photo points and site visits occur every year regardless of the monitoring year

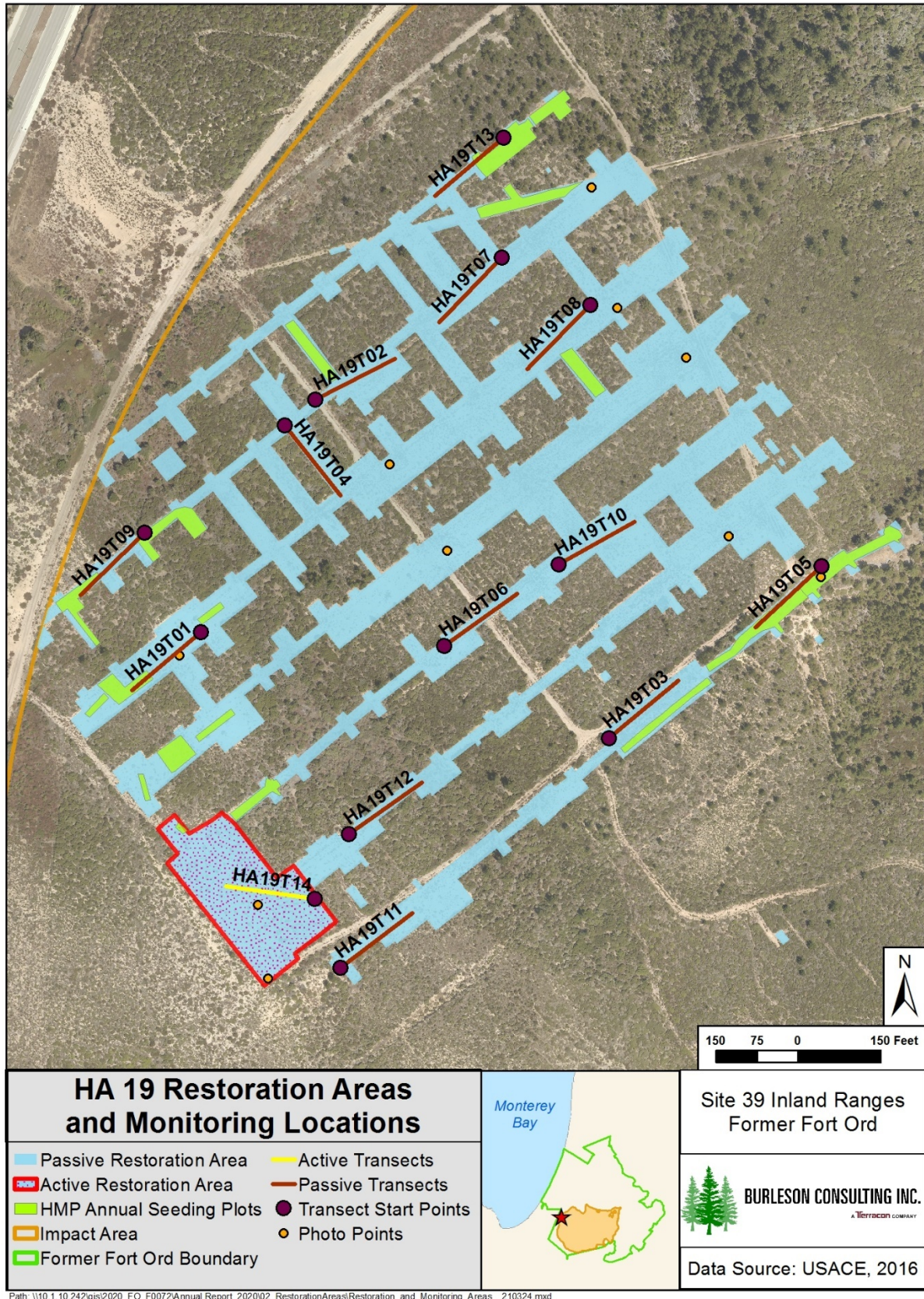


Figure 9-8. HA 19 Restoration Areas and Monitoring Locations Map

Table 9-10. 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
		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 9-10. 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 9-11 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.

Table 9-11. 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
ADFA	14.00	3.50	-	-	4.00	-	7.5
ARPU*	14.00	3.90	5.00	-	-	-	8.9
ARTO	28.00	7.00	-	-	-	-	7
ARCA	14.00	3.50	5.00	-	4.00	-	12.5
BAPI	2.10	0.53	1.00	-	4.00	-	5.53
CEDE	-	-	-	-	4.00	-	4
CERI*	14.00	3.70	5.00	-	4.00	-	12.7
CHPUP*	0.20	0.18	-	-	-	-	0.18
CRSC	14.00	3.50	5.00	-	4.00	-	12.5
DIAU	1.40	2.10	3.00	-	0.40	-	5.5
ELGL	126.00	31.70	45.00	-	36.00	12.00	124.7
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	-	7.8
GITEA*	0.20	-	-	0.20	-	-	0.2
HO	126.00	31.70	45.00	-	-	-	76.7
HOCU	28.00	7.00	10.00	-	16.00	-	33
LUAR	-	-	-	-	3.00	-	3
LUNA	-	-	-	-	1.00	-	1
SAME	14.00	3.50	5.00	-	4.00	-	12.5
STCE	70.00	17.50	-	-	-	-	17.5
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 9-12 summarizes the plants installed during active restoration.

Table 9-12. 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 7 of monitoring in 2020. Year 7 was not a required monitoring year and only photo documentation was completed.

9.2.3 Discussion

9.2.3.1 Recommendations

HA 19 was in year 7 of monitoring in 2020; the only monitoring that occurred was photo documentation. Recommendations were developed from a combination of prior recommendations and the restoration efforts completed in 2020. The site met three of six success criteria by 2018. Per recommendations in the 2016 Annual Habitat Restoration 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). The Army also recommends closing the access road. Overall, HA 19 requires more time to respond to the restoration effort and continued monitoring to evaluate areas that may need additional 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, HMP annual density surveys, species richness meandering transects, and vegetative cover line-intercept transects in year 8, 2021 (see Table 9-9). Table 9-13 summarizes the current status of HA 19 including which success criteria were met and recommendations.

Table 9-13. Status and Recommendations for Achieving Success Criteria at HA 19

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Wait to see how the HA responds
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	Yes	None

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 acre (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 in 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, and 2019. Monitoring at HA 22 began in 2013. HA 22 was monitored for ten 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 9-14). Figure 9-9 shows the historic area footprint, passive restoration area and transect monitoring locations. Success criteria for HA 22 are summarized in Table 9-15.

Table 9-14. Historic Summary of Restoration and Monitoring Activities at HA 22

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

* Photo points and site visits occur every year regardless of the monitoring year

† Vegetative cover was monitored using quadrats in 2016

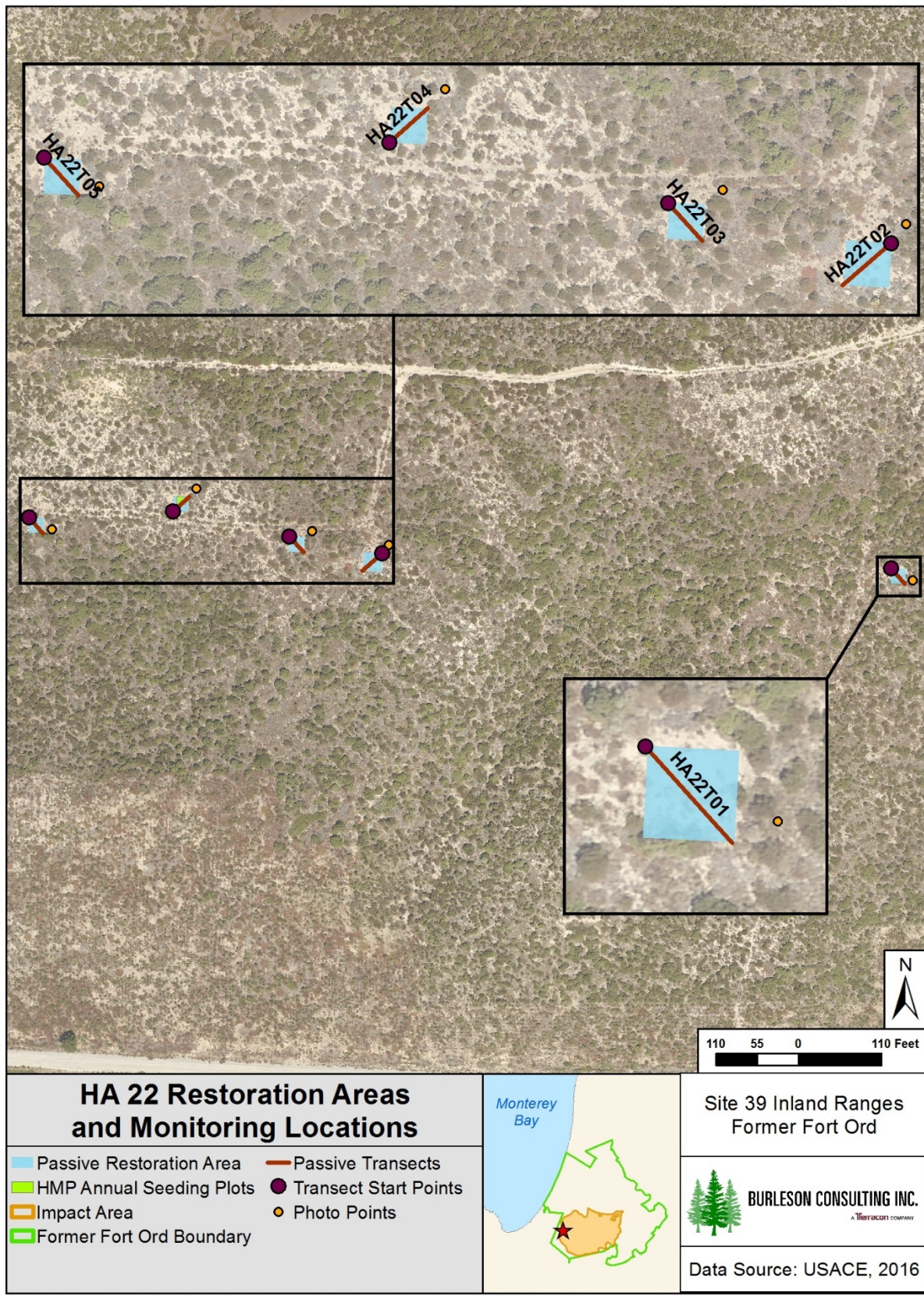


Figure 9-9. HA 22 Restoration Areas and Monitoring Locations Map

Table 9-15. 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 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
		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 9-15. 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. No additional passive restoration activities occurred in 2020. The total amount of seed broadcast on site was 1.219 lb compared to the 1.243 lb prescribed in the SSRP. Table 9-16 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.

Table 9-16. 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, an AMP planting event occurred in 2019 per recommendations made in the 2018 Annual Report (Burleson, 2019a). A total of 145 plants were installed at HA 22. Table 9-17 summarizes the plants installed during active restoration.

Table 9-17. Summary of Active Restoration Activities for HA 22

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

*HMP species

9.3.2 Monitoring Results

9.3.2.1 HMP Annual Density

One Monterey spineflower plot was surveyed for year 8 density at HA 22 in 2020. The plot is numbered 1 on Figure 9-28 and is located in the central part of the site. Monterey spineflower density was very high at Plot 1. Figure 9-10 summarizes all the Monterey spineflower restoration plot densities for HA 22.

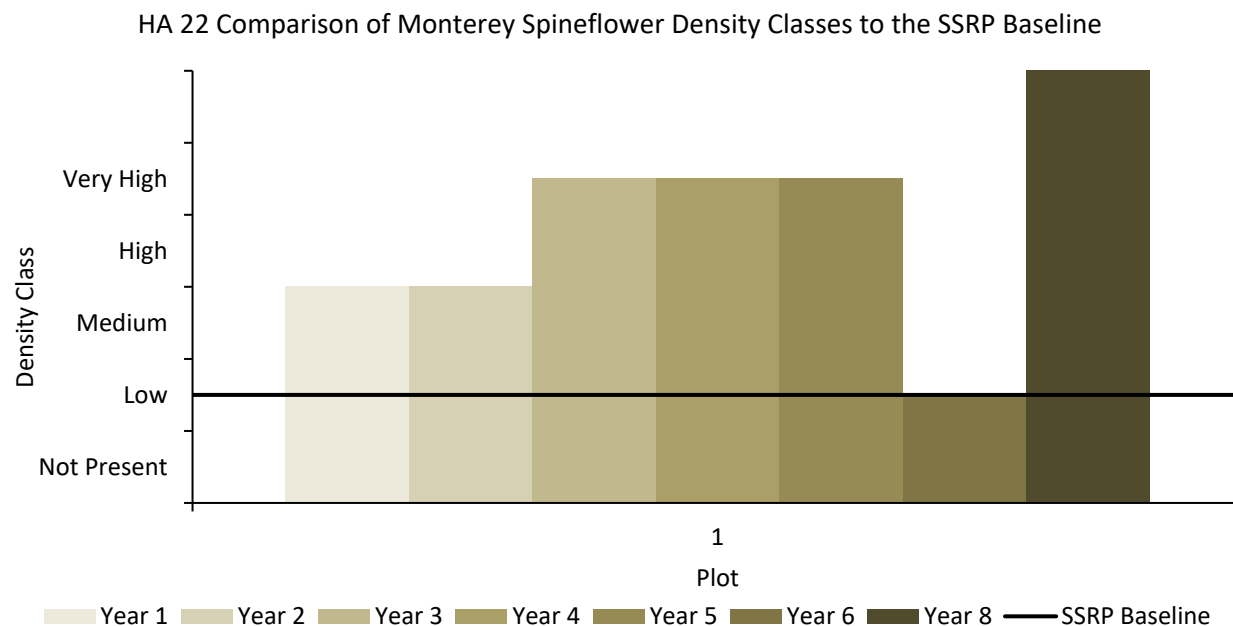


Figure 9-10. HA 22 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plot 1

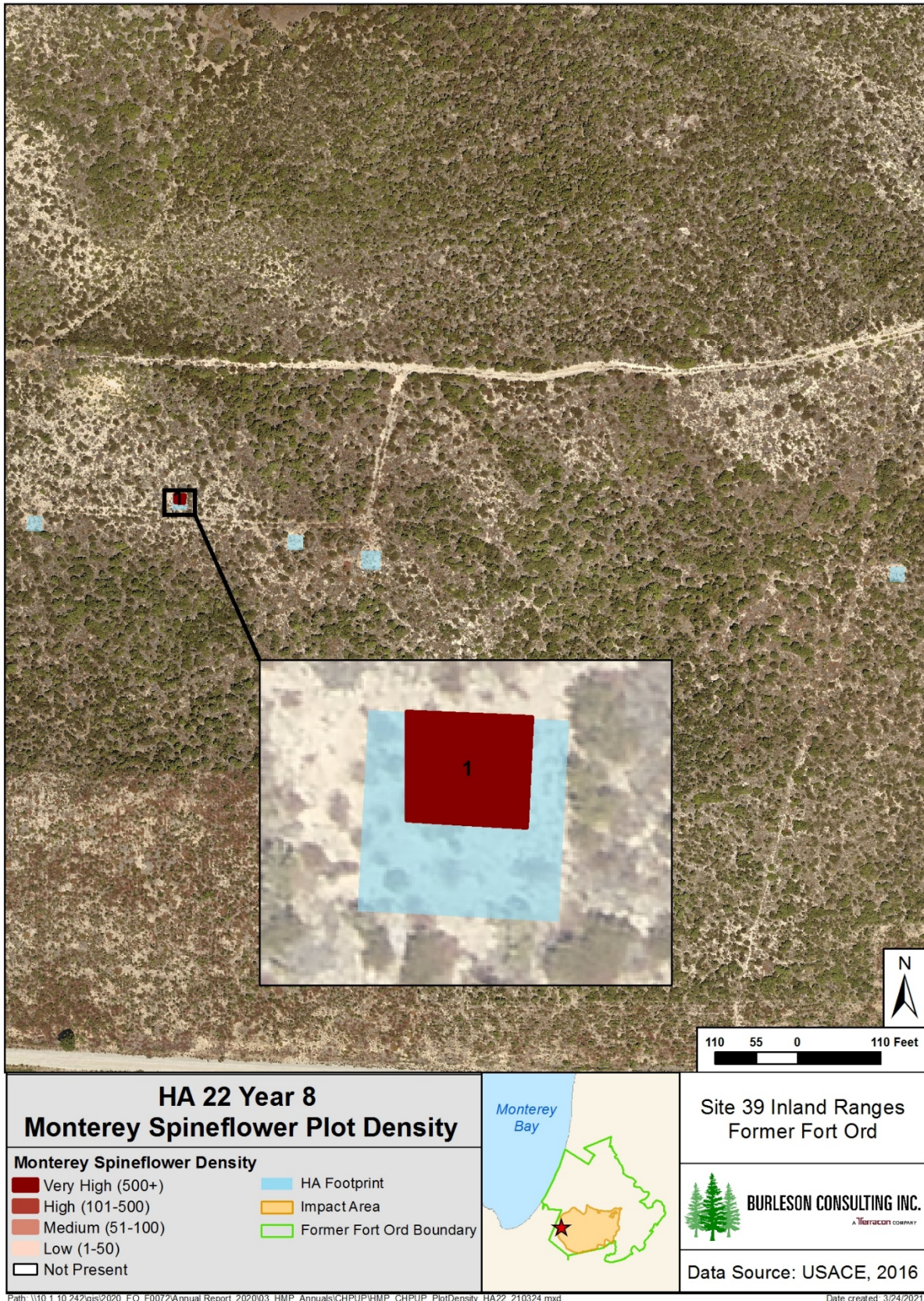


Figure 9-11. HA 22 Year 8 Monterey Spineflower Plot Density Map

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 Monterey spineflower and sand gilia at HA 22.

Five discrete patches of Monterey spineflower were mapped and individual plants were counted within each patch (see Figure 9-12). The density ranged from low to very high and the total acreage of Monterey spineflower patches with a density at or above the SSRP baseline density class of low was 0.05 acre. From 2018 to 2020, the density range increased and acreage above the SSRP baseline remained the same.

Two discrete patches of sand gilia were mapped and individual plants were counted within each patch (see Figure 9-13). The density was low and the total acreage of sand gilia patches with a density at or above a density class of low was 0.004 acre. From 2018 to 2020, the density range remained the same and acreage above a density class of low increased. Sand gilia is not an SSRP required species at HA 22.

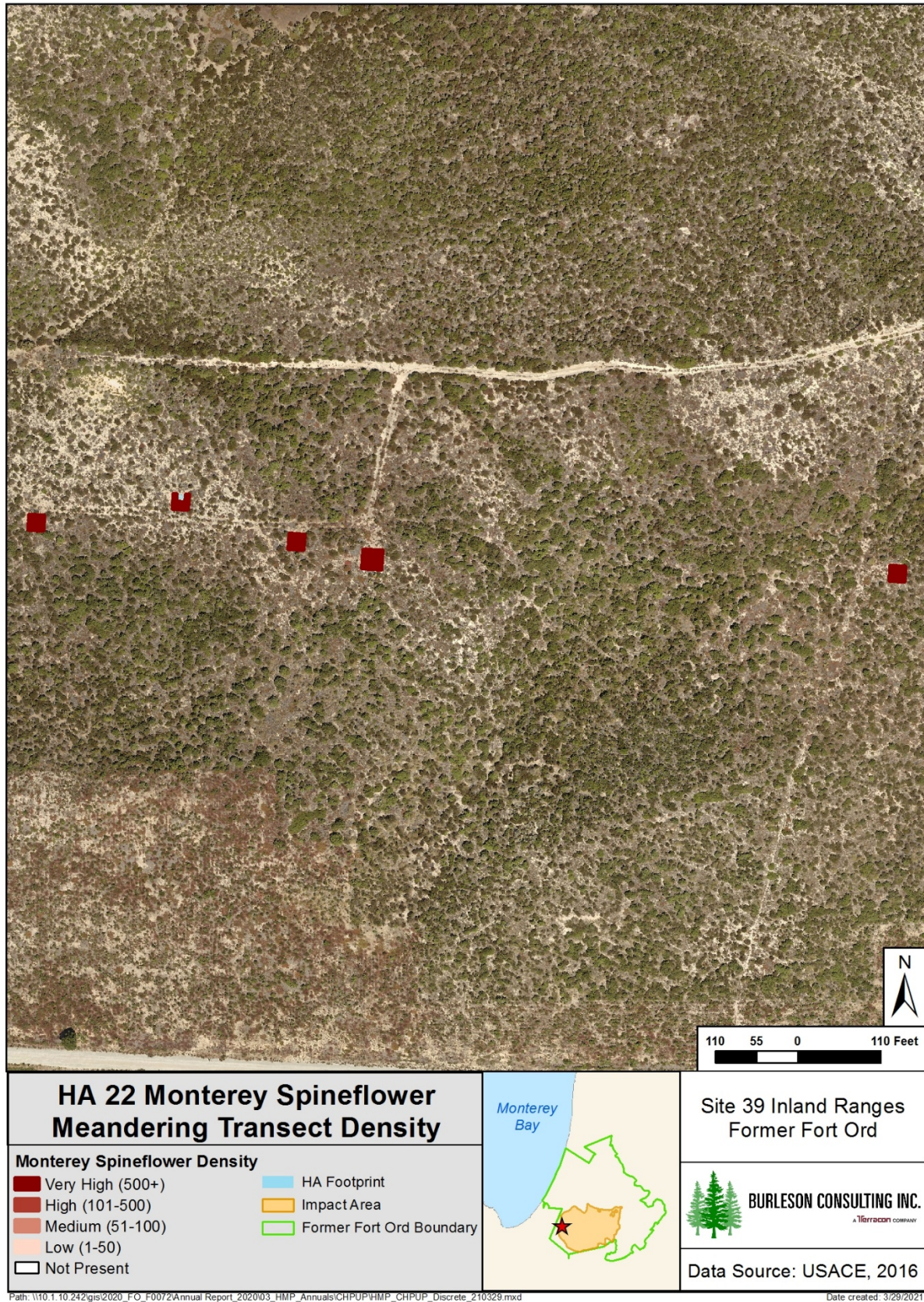


Figure 9-12. HA 22 Monterey Spineflower Meandering Transect Density Map

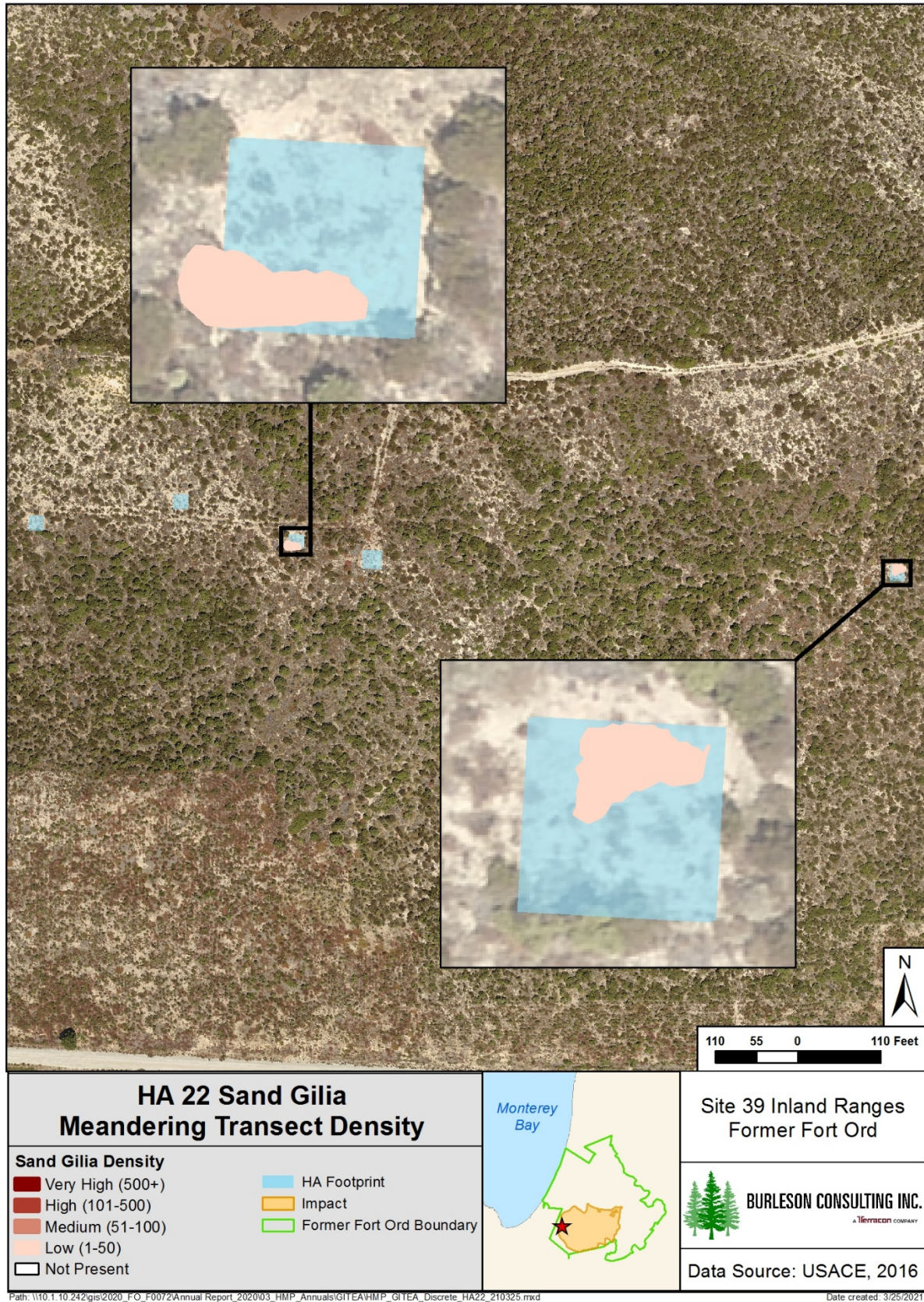


Figure 9-13. HA 22 Sand Gilia Meandering Transect Density Map

9.3.2.2 Plant Survivorship

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

9.3.2.3 Species Richness

Thirty-five species were observed at HA 22. Of those, 19 were native shrubs or perennials, nine were native annual herbaceous species, and seven were non-native species (see Table 9-18). Species richness increased by seven species since 2018. Native shrub and perennial species increased by three, native herbaceous species increased by one, and non-native species increased by three.

Table 9-18. Species Observed at HA 22, 2020

Scientific Name	Common Name	Code	Category
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Artemisia pycnocephala</i>	coastal sagewort	ARPY	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Camissoniopsis micrantha</i>	small primrose	CAMI	NF
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Croton californicus</i>	California croton	CRCA	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Dudleya farinosa</i>	bluff lettuce	DUFA	NP
<i>Eriastrum virgatum</i>	virgate eriastrum	ERVI	NF
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI	NNF
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	GITEA	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA	NNF
<i>Madia sativa</i>	coast tarweed	MASA	NF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Plagiobothrys</i> sp.	popcorn flower	PL	NF
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Schismus barbatus</i>	old han schismus	SCBA	NNF

* HMP species

9.3.2.4 Vegetative Cover

Burleson completed five line-intercept transects ranging from seven to 11 meters in length at HA 22. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 48.91%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2018 by 2.03%. Table 9-19 summarizes vegetative cover and Table 9-20 presents vegetative cover by species. Figure 9-14 presents the percent cover of dominant species at HA 22 in 2017, 2018, and 2020.

Table 9-19. Transect Survey Summary for HA 22

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA22T01	28.50	28.50	0.00	83.62	16.38
HA22T02	41.09	41.09	0.00	81.91	14.91
HA22T03	66.14	66.14	0.00	95.71	4.29
HA22T04	33.33	33.33	0.00	71.44	24.11
HA22T05	82.50	82.50	0.00	80.25	8.62
SITE AVERAGE*	48.91	48.91	0.00	81.98	14.21

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

Table 9-20. Transect Survey Results for HA 22 by Species

Transect	ACGL (%)	ARPU* (%)	CHPUP (%)	COFI (%)	CRCA (%)	CRSC (%)	ERER (%)	HOCU (%)	TH (%)	BG (%)
HA22T01	12.25	0.00	0.00	0.00	2.50	9.75	2.75	1.25	83.63	16.38
HA22T02	29.73	0.00	0.00	0.00	2.55	0.00	8.82	0.00	81.91	14.91
HA22T03	54.14	0.00	0.00	0.00	12.00	0.00	0.00	0.00	95.71	4.29
HA22T04	10.89	0.00	3.00	0.00	0.00	0.00	19.44	0.00	71.44	24.11
HA22T05	26.25	14.25	0.00	2.75	6.00	7.13	19.25	6.88	80.25	8.62
SITE AVERAGE†	25.86	2.65	0.63	0.51	4.19	3.14	10.42	1.51	81.98	14.21

* HMP Species

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

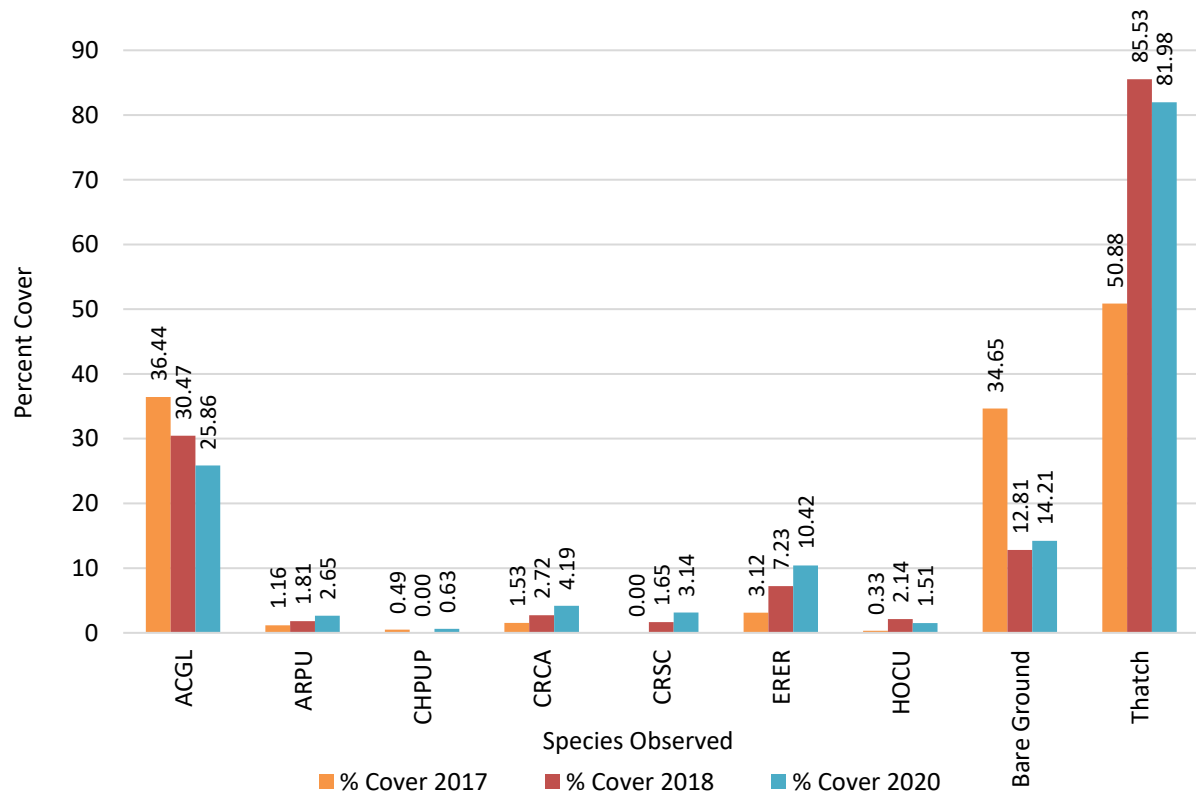


Figure 9-14. Percent Cover of Dominant Species at HA 22 in 2017, 2018, and 2020.

9.3.3 Discussion

9.3.3.1 Recommendations

HA 22 was in year 8 of monitoring in 2020. The site met four of six success criteria by 2020. Per recommendations in the 2016 Annual Habitat Restoration Report, sandmat manzanita, shaggy-bark manzanita, coyote brush, Monterey ceanothus, dwarf ceanothus, mock heather, Eastwood's goldenbush, golden yarrow, sticky monkeyflower, and black sage were planted in the 2018/2019 season to support the species richness and HMP shrub cover criteria (Burleson, 2017). Additionally, the Army recommends planting sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush to support the HMP shrub cover criteria. Overall, HA 22 requires more time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-3 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, 2025 (see Table 9-14). Table 9-21 summarizes the current status of HA 22 including which success criteria were met and recommendations.

Table 9-21. Status and Recommendations for Achieving Success Criteria at HA 22

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	Yes	None
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Plant sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush*
Objective 3 – No. 4	HMP shrub cover by species	No	Plant sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush*
Objective 3 – No. 4	HMP annual density	Yes	None

* Not scheduled

9.3.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 22. The SSRP baseline density class for Monterey spineflower was low. Year 8 Monterey spineflower restoration plot results show that the density exceeded the success criterion under Objective 3. In addition, Monterey spineflower was present outside the restoration plots. Discrete patches of Monterey spineflower, with densities that met or exceeded the success criterion, covered 0.05 acre of HA 22. This concludes HMP annual monitoring for Monterey spineflower at HA 22, the success criterion has been met.

Although not part of the success criterion, sand gilia was present at HA 22. Sand gilia covered 0.004 acre at low density.

9.3.3.3 Plant Survivorship

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

9.3.3.4 Species 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, and black sage were present. HA 22 included 19 native shrub and perennial species and met the success criterion for Objective 1.

9.3.3.5 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 22 SSRP (Burleson, 2013). These species contributed 48.40% cover to the HA (see Figure 9-15). In 2016, quadrats were completed to provide a preliminary idea of vegetative cover with a limited amount of effort. From 2017 onward, line-intercept transect surveys were used as multiple objectives outlined in the SSRP specifically require transect data. The 2016 quadrat data were not compared to the success criteria.

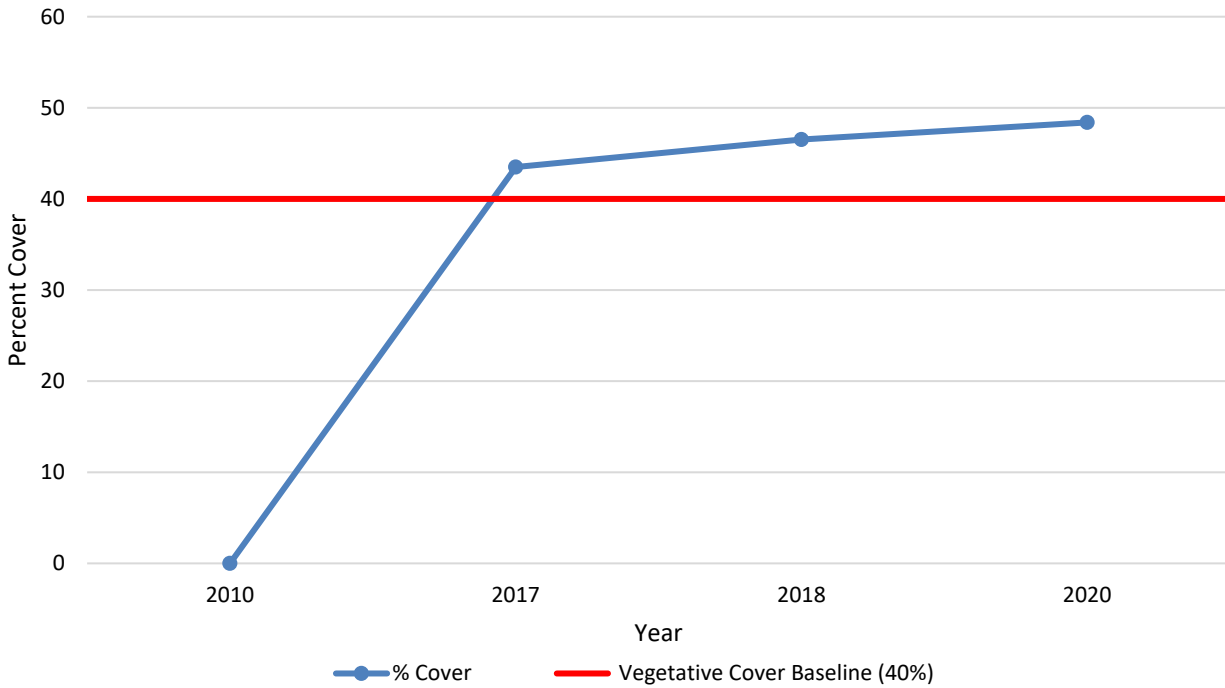


Figure 9-15. Native Vegetative Cover Compared to the Success Criterion at HA 22

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 22 provided an absolute cover of 2.65%; therefore, the HA did not meet this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 22, this means a vegetative cover average of at least 20% cover for sandmat manzanita, 4% Monterey ceanothus, and 1% Eastwood's goldenbush. The average vegetative cover for sandmat manzanita was 2.65%, Monterey ceanothus was 0.00%, and Eastwood's goldenbush was 0.00% (see Figure 9-16). Therefore, the success criterion was not met. Monterey ceanothus and Eastwood's goldenbush are both present in small numbers on site, but not detected on the transect.

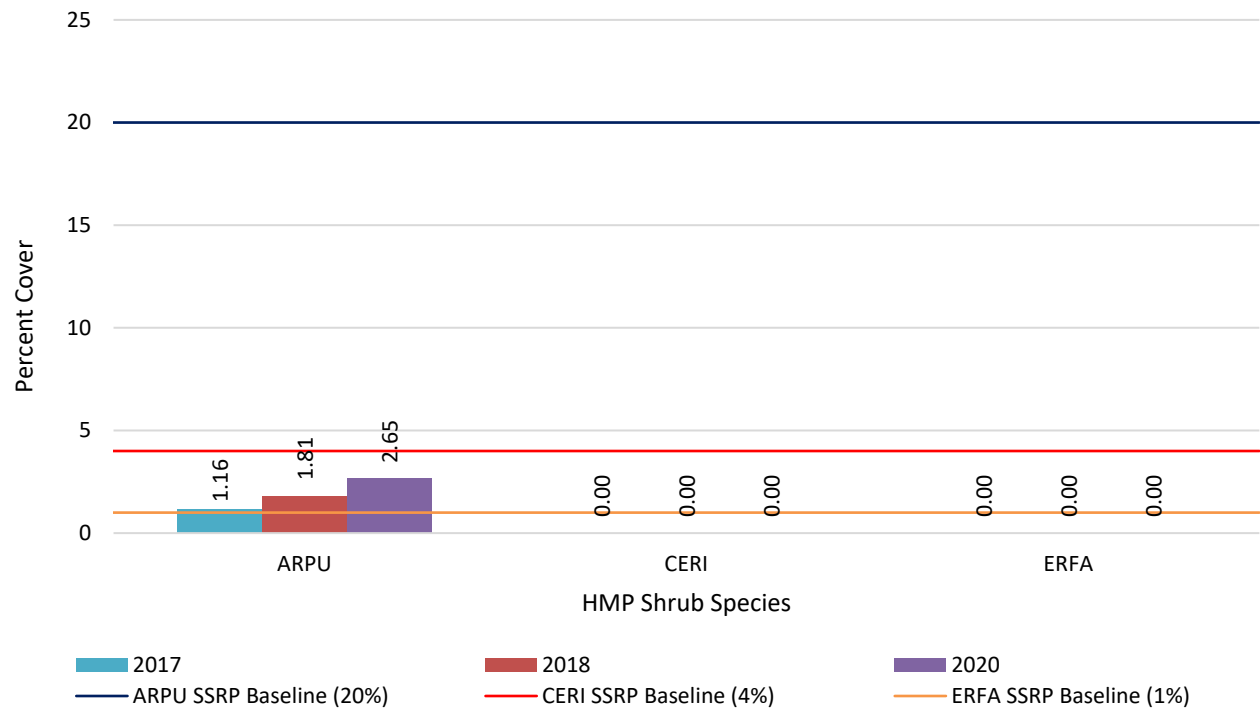


Figure 9-16. HMP Shrub Species Comparison to Success Criteria at HA 22

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 acre (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, and 2020 and monitoring began in 2013. The HA was monitored for ten 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 9-22). Figure 9-17 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 23 are summarized in Table 9-23.

Table 9-22. Historic Summary of Restoration and Monitoring Activities at HA 23

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

* Photo points and site visits occur every year regardless of the monitoring year

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

‡ Vegetative cover was monitored using quadrats in 2016

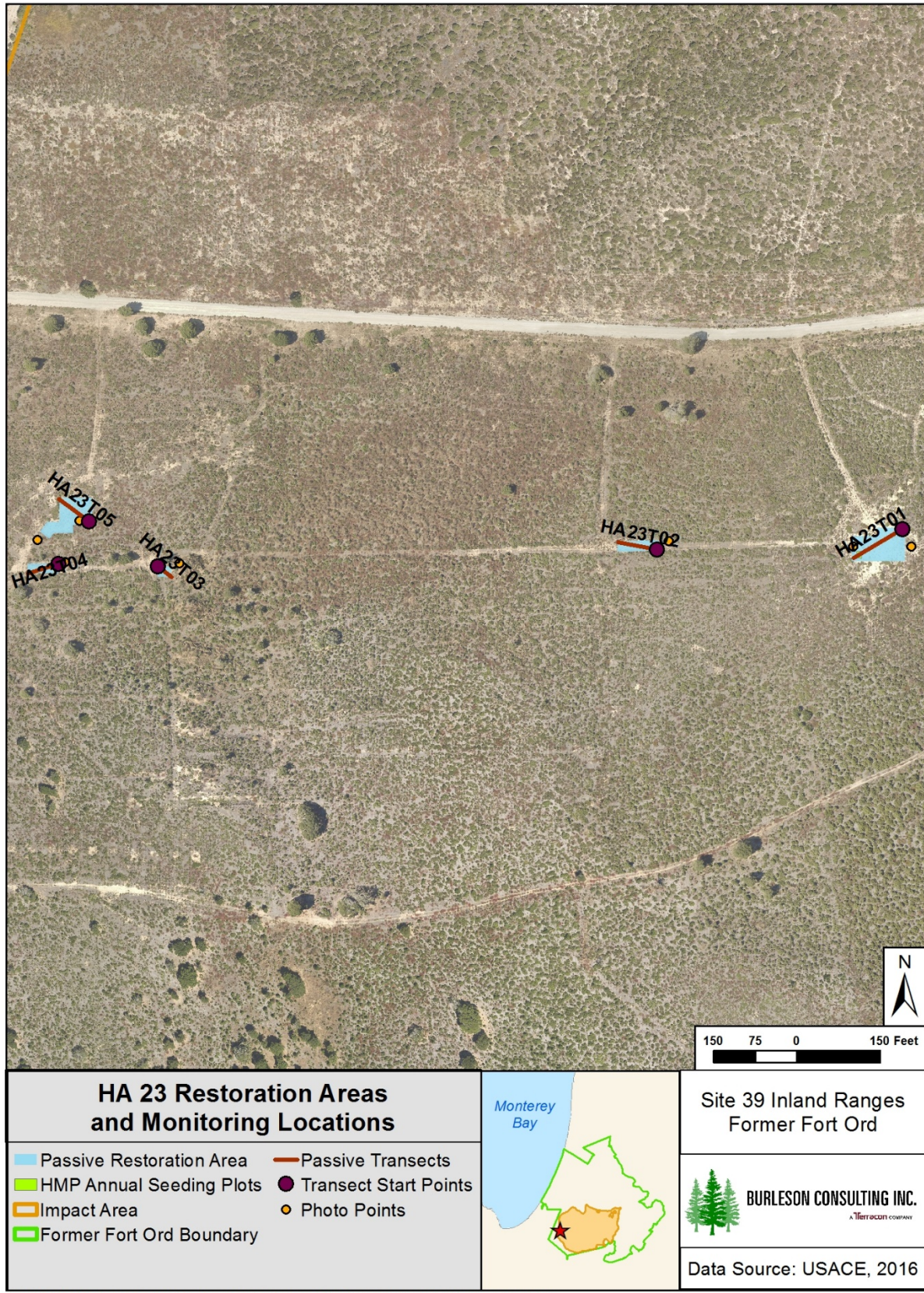


Figure 9-17. HA 23 Restoration Areas and Monitoring Locations Map

Table 9-23. 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
		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 9-24 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.

Table 9-24. Summary of Passive Restoration Activities for HA 23

Species	Pounds of Seed Broadcast					Total by Species
	SSRP Target	2011	2012	2019	2020	
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, an AMP planting event occurred in 2019 per recommendations made in the 2018 Annual Report (Burleson, 2019a). A total of 95 plants were installed at HA 23. Table 9-25 summarizes the plants installed during active restoration.

Table 9-25. Summary of Active Restoration Activities for HA 23

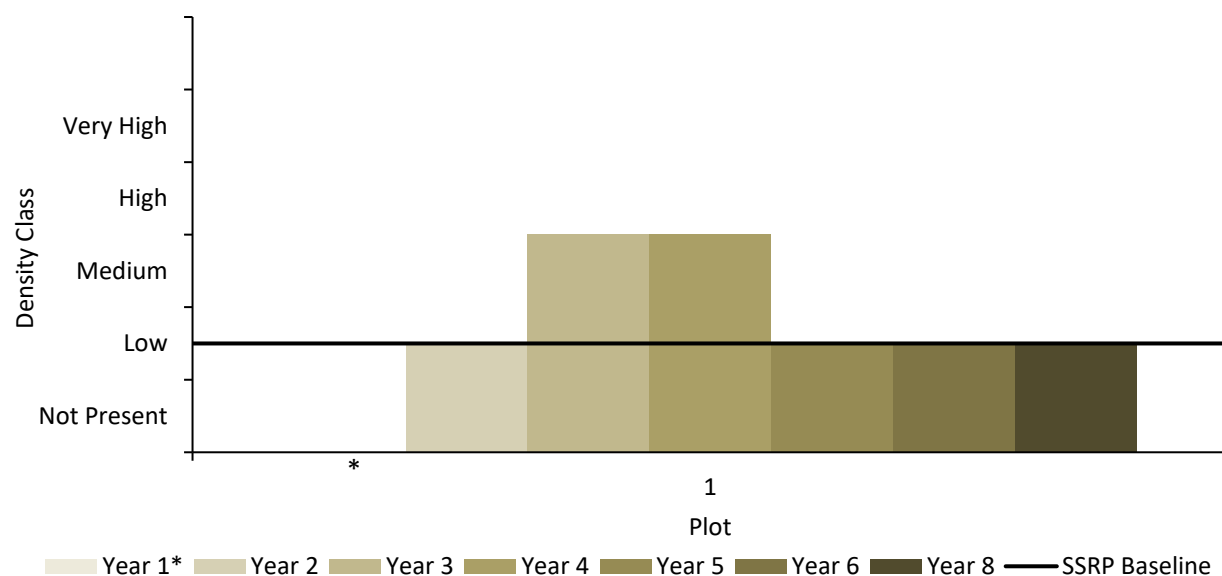
Species	Number of Individual Plants	
	2019	Total by Species
ARPU*	10	10
BAPI	6	6
CEDE	18	18
CERI*	20	20
ERCO	6	6
ERFA*	35	35
TOTAL	95	95

*HMP species

9.4.2 Monitoring Results

9.4.2.1 HMP Annual Density

One Monterey spineflower plot was surveyed for year 8 density at HA 23 in 2020. The plot is numbered 1 on Figure 9-19 and is located in the eastern polygon on the site. Monterey spineflower density was low at Plot 1. Figure 9-10 summarizes all the Monterey spineflower restoration plot densities for HA 23.

HA 23 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline

* Plot 1 was not surveyed in year 1 due to UXO activity

Figure 9-18. HA 23 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plot 1

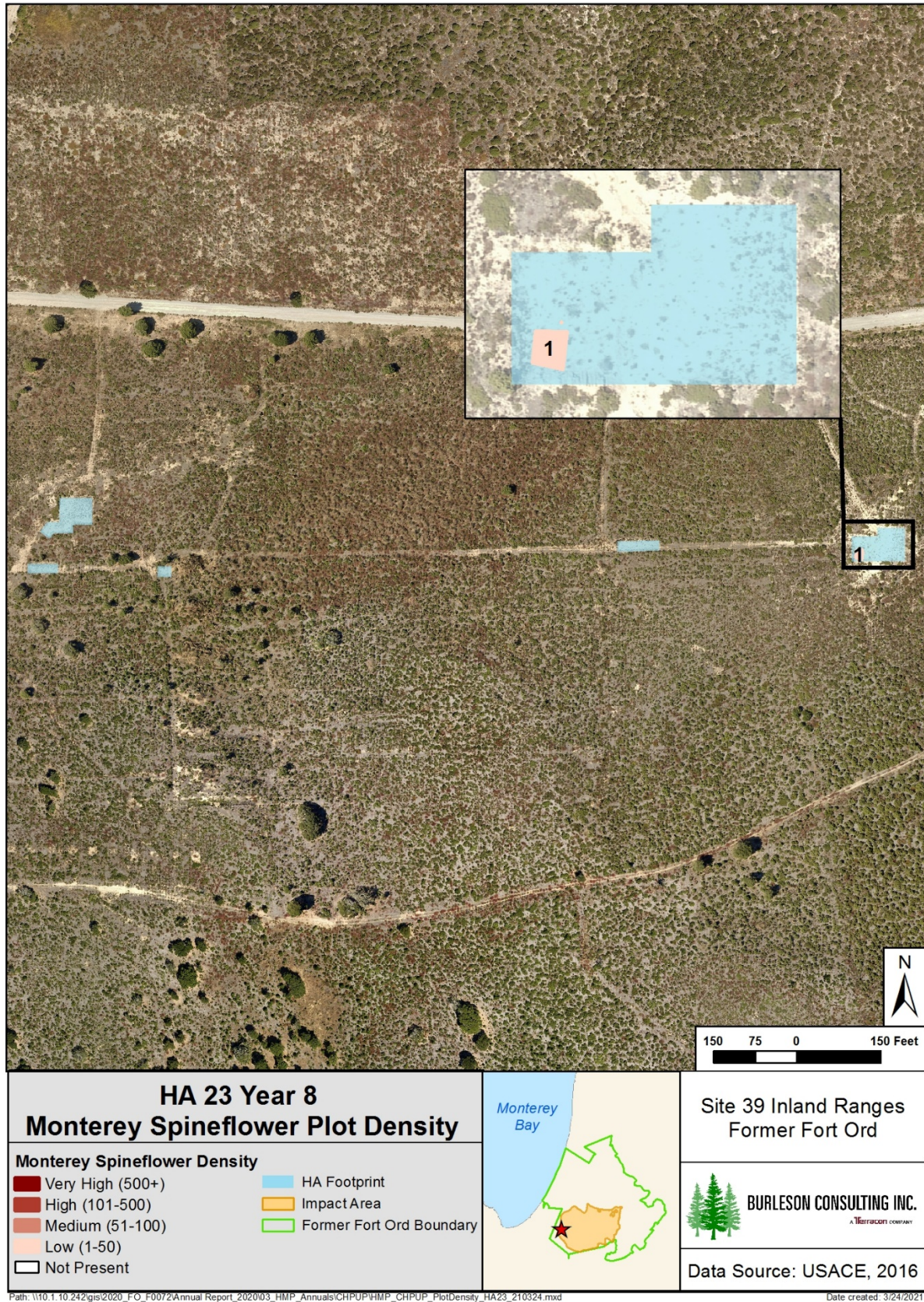


Figure 9-19. HA 23 Year 8 Monterey Spineflower Plot Density Map

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 Monterey spineflower, sand gilia, and seaside bird's beak at HA 23.

Sixty-two individual plants and six discrete patches of Monterey spineflower were mapped and individual plants were counted within each patch (see Figure 9-20). 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 0.09 acre. From 2018 to 2020, the density range remained the same and acreage above the SSRP baseline increased.

One discrete patch of sand gilia was mapped and individual plants were counted within the patch (see Figure 9-21). The density was low and the total acreage of sand gilia patches with a density at or above a density class of low was 0.002 acre. From 2018 to 2020, the density range and acreage above a density class of low remained the same. Sand gilia is not an SSRP required species at HA 23.

Three discrete patches of seaside bird's beak were mapped and individual plants were counted within each patch (see Figure 9-22). The density ranged from low to medium and the total acreage of seaside bird's beak with a density at or above a density class of low was 0.09 acre. From 2018 to 2020, the density range increased and acreage above a density class of low remained the same. Seaside bird's beak is not an SSRP required species at HA 23.

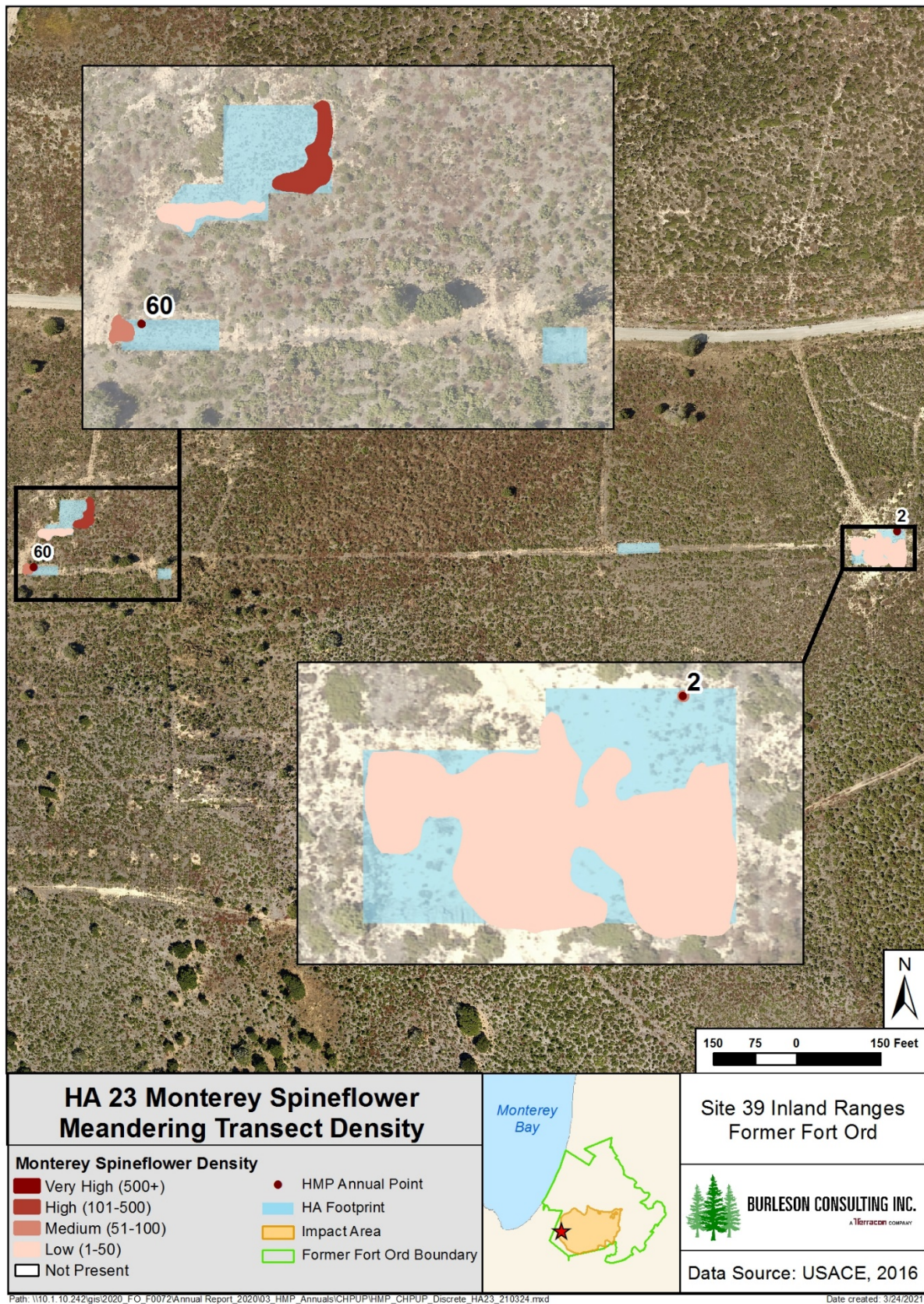


Figure 9-20. HA 23 Monterey Spineflower Meandering Transect Density Map

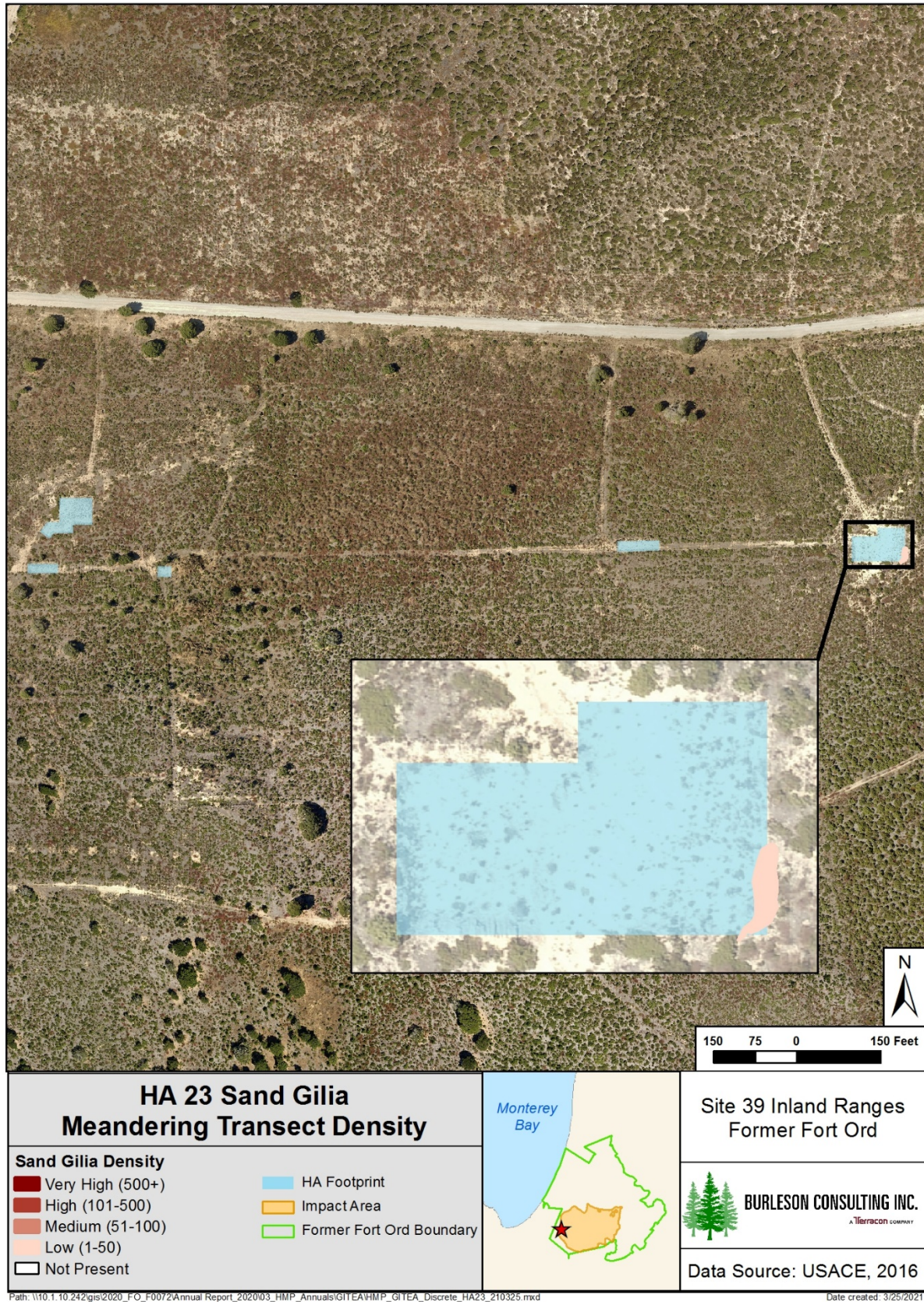


Figure 9-21. HA 23 Sand Gilia Meandering Transect Density Map

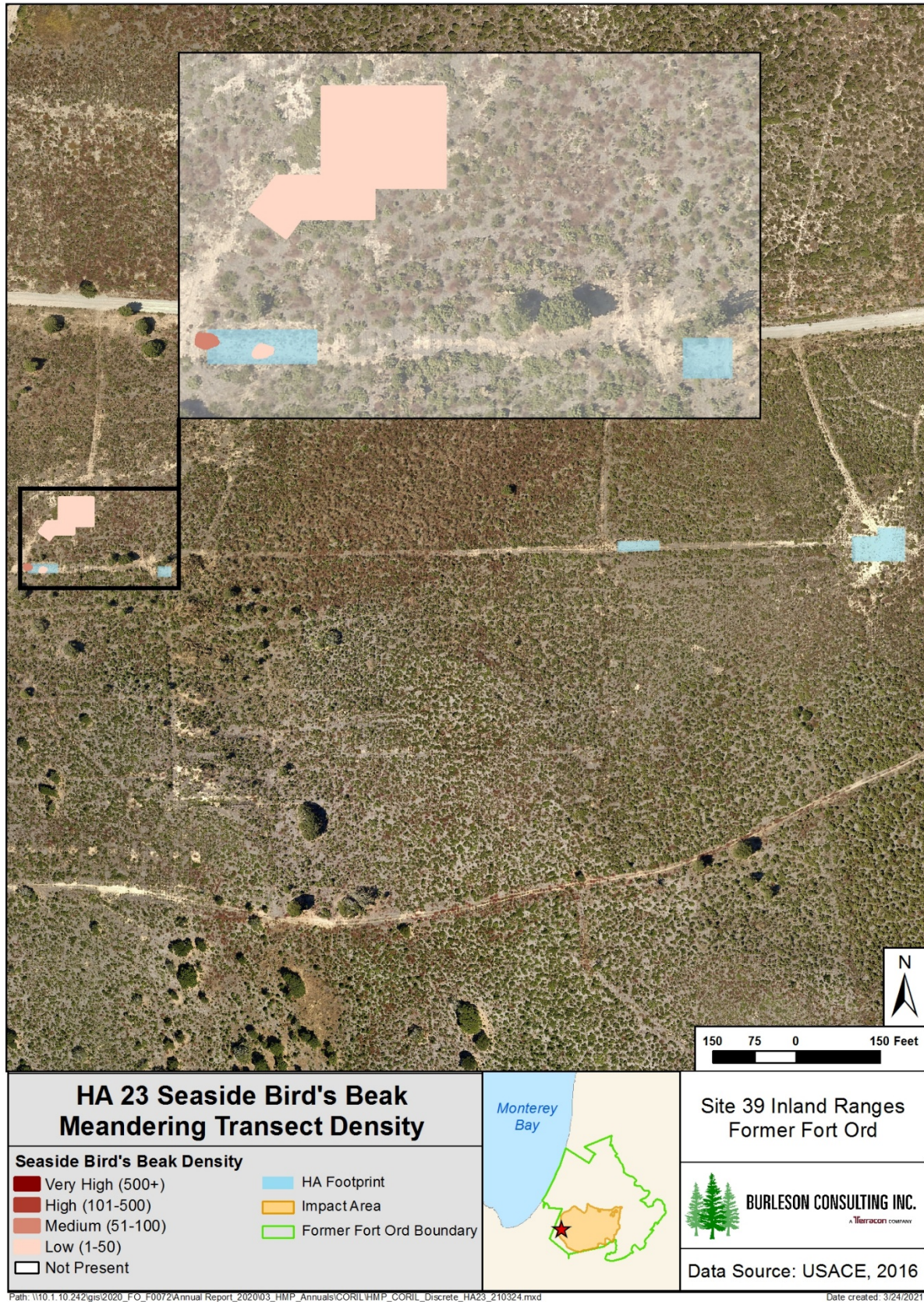


Figure 9-22. HA 23 Seaside Bird's Beak Meandering Transect Density Map

9.4.2.2 Plant Survivorship

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

9.4.2.3 Species Richness

Forty-one species were observed at HA 23. Of those, 25 were native shrubs or perennials, nine were native annual herbaceous species, and seven were non-native species (see Table 9-26). Species richness decreased by ten species since 2018. Native shrub and perennial species decreased by five, native herbaceous species decreased by four, and non-native species increased by one.

Table 9-26. Species Observed on HA 23, 2020

Scientific Name	Common Name	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Carex</i> sp.	sedge	CA	NP
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> *	seaside bird's-beak	CORIL	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Croton californicus</i>	California croton	CRCA	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Festuca octoflora</i>	sixweeks grass	FOEC	NF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	GITEA	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA	NP
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR	NF
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Salvia mellifera</i>	black sage	SAME	NP

Table 9-26. Species Observed on HA 23, 2020

Scientific Name	Common Name	Code	Category
<i>Senecio glomeratus</i>	cutleaf burnweed	SEGL	NNF
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP

* HMP species

9.4.2.4 Vegetative Cover

Burleson completed five line-intercept transects ranging from eight to 32 meters in length at HA 23. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 33.26%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2018 by 4.15%. Table 9-27 summarizes vegetative cover and Table 9-28 presents vegetative cover by species. Figure 9-23 presents the percent cover of dominant species at HA 22 in 2017, 2018, and 2020.

Table 9-27. Transect Survey Summary for HA 23

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA23T01	17.59	17.59	0.00	41.56	56.72
HA23T02	22.73	22.73	0.00	66.18	33.82
HA23T03	38.88	38.88	0.00	100.00	0.00
HA23T04	58.87	58.87	0.00	97.80	2.20
HA23T05	47.71	47.71	0.00	83.57	16.43
SITE AVERAGE*	33.26	33.26	0.00	69.47	29.97

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

Table 9-28. Transect Survey Results for HA 23 by Species

Transect	ACGL (%)	ADFA (%)	ARMO*	ARPU*	ARTO (%)	CEDE (%)	CERI*	COFI (%)	CRSC (%)	DIAU (%)	ERCO (%)	HOCU (%)	TODI (%)	TH (%)	BG (%)
HA23T01	0.31	0.00	0.00	5.66	0.00	0.00	2.88	2.34	4.72	0.00	0.66	1.03	0.00	41.56	56.72
HA23T02	0.91	0.00	0.59	5.23	8.09	0.91	0.91	0.00	3.50	0.73	0.00	1.86	0.00	66.18	33.82
HA23T03	4.88	0.00	0.00	12.00	6.38	0.00	0.00	0.00	1.88	5.62	0.00	8.13	0.00	100.00	0.00
HA23T04	0.00	0.00	0.00	37.53	0.00	0.00	0.00	0.00	17.53	0.00	0.00	1.00	2.80	97.80	2.20
HA23T05	4.05	1.48	0.62	25.43	0.00	0.00	0.00	4.33	8.48	3.33	0.00	0.00	0.00	83.57	16.43
SITE AVERAGE†	1.57	0.32	0.27	15.19	2.34	0.20	1.14	1.69	6.98	1.34	0.21	1.57	0.43	69.47	29.97

* HMP species

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

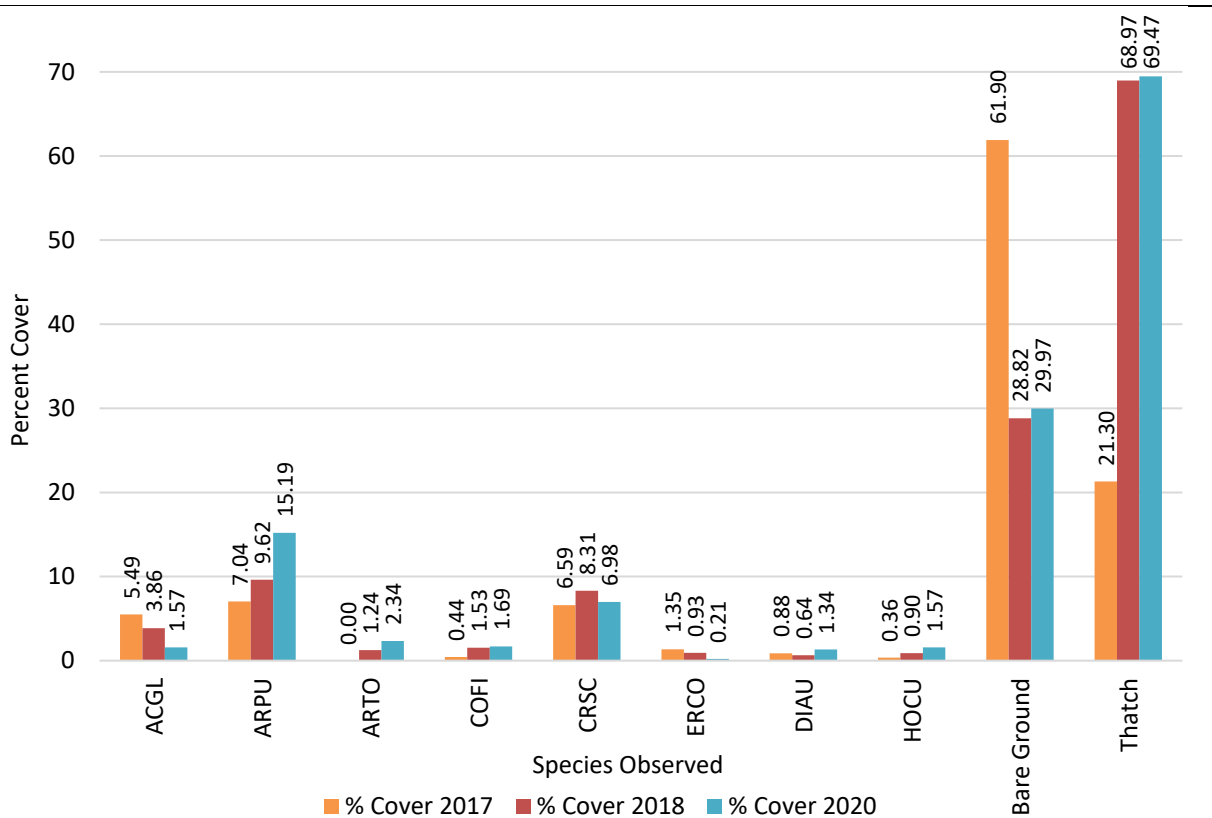


Figure 9-23. Percent Cover of Dominant Species at HA 23 in 2017, 2018, and 2020.

9.4.3 Discussion

9.4.3.1 Recommendations

HA 23 was in year 8 of monitoring in 2020. The site met four out of six success criteria by 2020. Per recommendations in the 2018 Annual Habitat Restoration 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 (Burleson, 2019a). The Army recommends planting additional Monterey ceanothus and Eastwood's goldenbush to support the HMP shrub cover by species criterion. Overall, HA 23 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-4 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, 2025 (see Table 9-22). Table 9-29 summarizes the current status of HA 23 including which success criteria were met and recommendations.

Table 9-29. Status and Recommendations for Achieving Success Criteria at HA 23

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	No	Plant Monterey ceanothus and Eastwood's goldenbush*
Objective 3 – No. 4	HMP annual density	Yes	None

* Not scheduled

9.4.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 23. The SSRP baseline density class for Monterey spineflower was low. Year 8 Monterey spineflower restoration plot results show that the density within the plot met the success criterion under Objective 3. In addition, Monterey spineflower was present outside the restoration plot. Discrete patches, with density that met or exceeded the success criterion, covered 0.09 acre of HA 23. This concludes HMP annual monitoring for Monterey spineflower at HA 23, the success criterion has been met.

Although not part of the success criterion, sand gilia and seaside bird's beak were both present at HA 23. Sand gilia covered 0.002 acres and seaside bird's beak covered 0.09 acres; discrete patches for sand gilia had low density and patches for seaside bird's beak had low and medium density.

9.4.3.3 Plant Survivorship

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

9.4.3.4 Species Richness

Chamise, sandmat manzanita, shaggy-bark manzanita, Monterey spineflower, mock heather, Eastwood's goldenbush, peak rush-rose, deerweed, sticky monkeyflower, coyote brush, Monterey ceanothus, dwarf ceanothus, golden yarrow, and black sage were present. HA 23 included 25 native shrub and perennial species and met the success criterion for Objective 1.

9.4.3.5 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 23 SSRP (Burleson, 2013). These species contributed 30.66% cover to the HA (see Figure 9-24). This success criterion was not met. In 2016, quadrats were completed to provide a preliminary idea of vegetative cover with a limited amount of effort. From 2017 onward, line-intercept transect surveys were used as multiple objectives outlined in the SSRP specifically require transect data. The 2016 quadrat data were not compared to the success criteria.

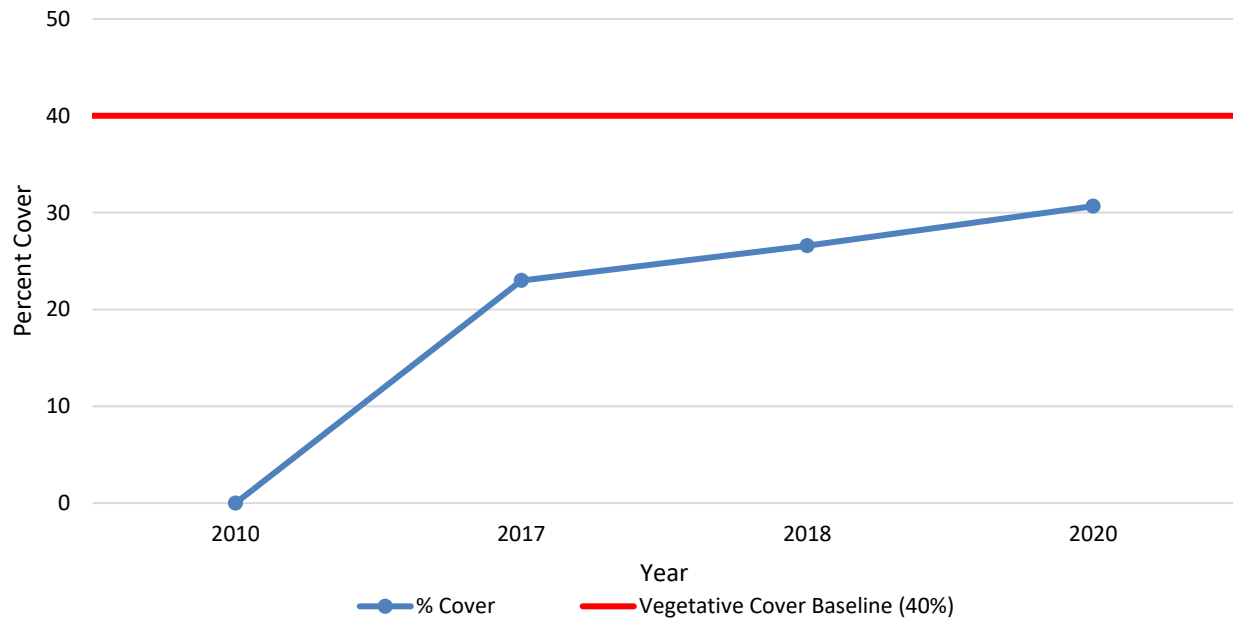


Figure 9-24. Native Vegetative Cover Compared to the Success Criterion at HA 23

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 23 provided an absolute cover of 16.34%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 23, this means a vegetative cover average of at least 20% cover for sandmat manzanita, 4% Monterey ceanothus, and 1% Eastwood's goldenbush. The average vegetative cover for sandmat manzanita was 15.19%, Monterey ceanothus was 1.14%, and Eastwood's goldenbush was 0.00% (see Figure 9-25). Therefore, the success criterion was not met. Eastwood's goldenbush is present on site, but is not detected by the transects.

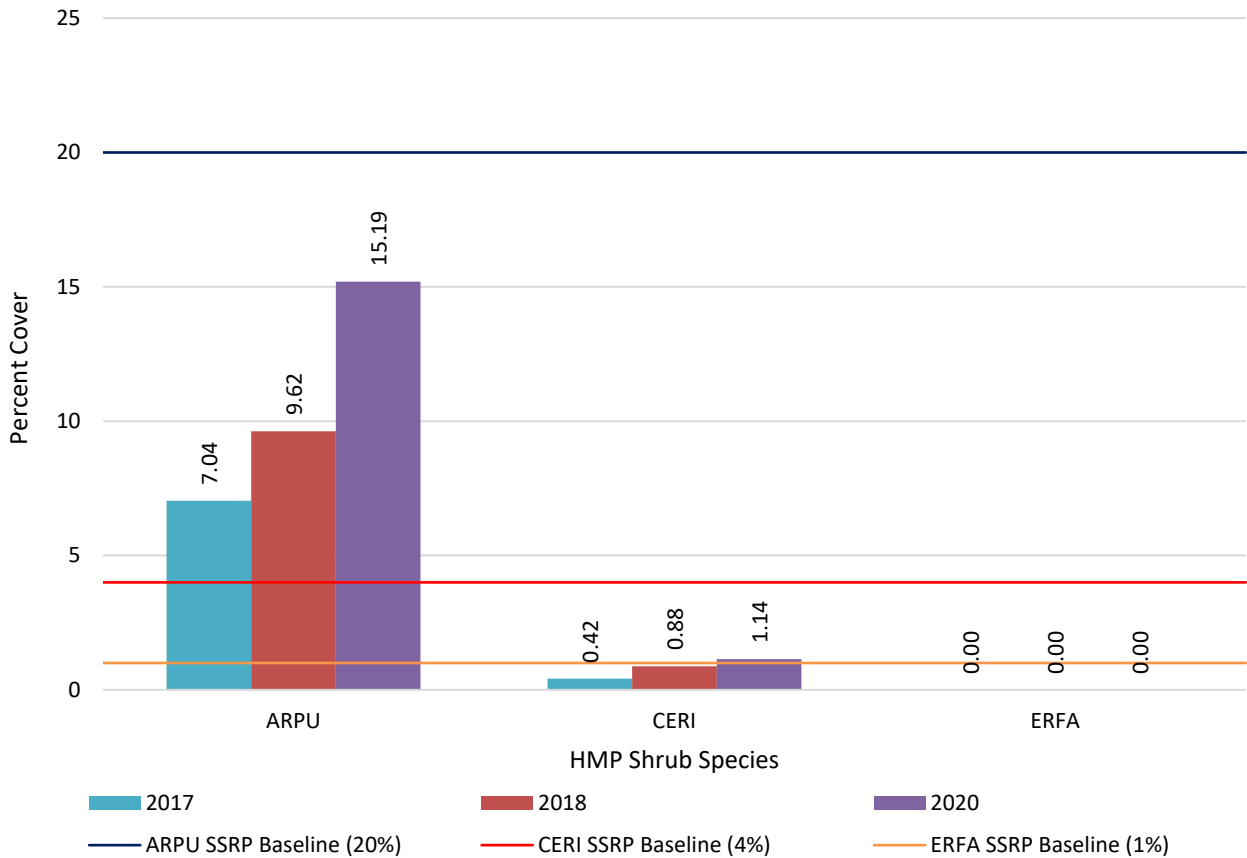


Figure 9-25. HMP Shrub Species Comparison to Success Criteria at HA 23

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 and monitoring at HA 26 began in 2016 and are ongoing. The HA was monitored for seven years by photo documentation and site visits; five years for HMP annual density in plots, HMP annual density across the HA, and species richness; four years for vegetative cover; and three years for plant survivorship (see Table 9-30). Figure 9-26 shows the HA footprint, passive restoration area, and active restoration area. Success criteria for HA 26 are summarized in Table 9-31.

Table 9-30. Historic Summary of Restoration and Monitoring Activities at HA 26

Activity	Monitoring Years								
			1	2	3	4	5	8	13
	2014	2015	2016	2017	2018	2019	2020	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					●	●	●	●	

* Photo points and site visits occur every year regardless of the monitoring year

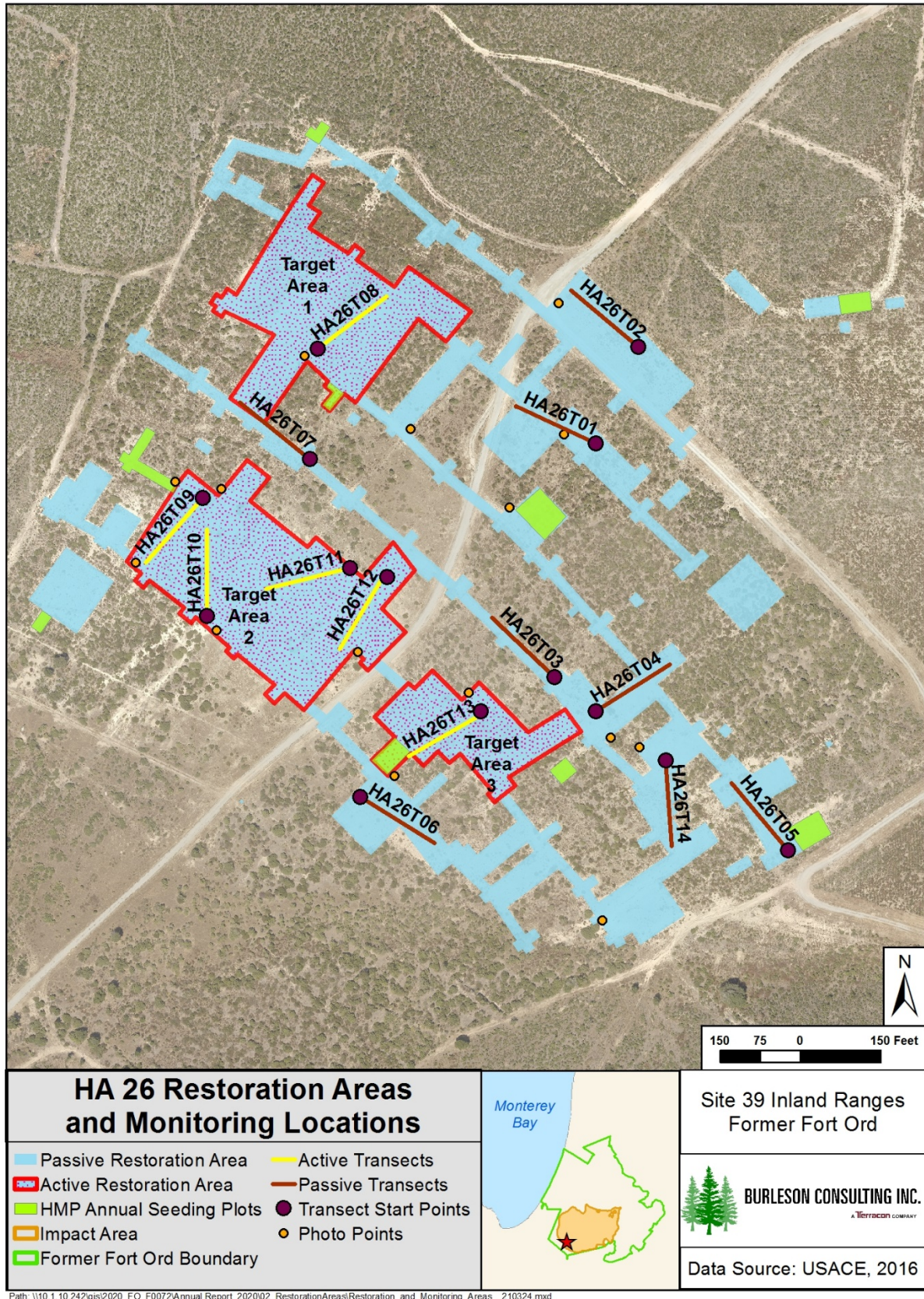


Figure 9-26. HA 26 Restoration Areas and Monitoring Locations Map

Table 9-31. 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
		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 in 2016, 2017, 2018, 2019, and 2020. The total amount of seed broadcast on site was 634.50 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 9-32 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.

Table 9-32. Summary of Passive Restoration Activities for HA 26

Species	Pounds of Seed Broadcast						Total by Species
	SSRP Target	2016	2017	2018	2019	2020	
ACMI	14.00	5.24	18.05	9.35	3.30	37.20	73.14
ACGL	28.00	10.48	10.17	4.00	7.00	43.20	74.85
BAPI	2.10	1.05	0.45	0.80	0.20	0.20	2.7
CERI*	14.00	5.24	2.27	4.00	1.00	1.00	13.51
CHPUP*	2.10	0.84	-	0.21	0.21	0.21	1.47
CRSC	10.50	4.20	1.81	3.20	0.80	0.80	10.81
DIAU	7.00	2.62	1.13	2.00	0.50	0.50	6.75
ELGL	42.00	15.72	81.36	36.40	11.30	65.8	210.58
ERFA*	1.40	0.52	0.23	0.40	0.10	0.10	1.35
ERCO	14.00	5.24	2.27	4.00	1.00	1.00	13.51
FRCA	-	-	-	0.60	0.15	0.15	0.9
GAEL	-	-	-	1.60	0.15	0.15	1.9
HO	126.00	47.20	22.65	41.20	10.00	20.00	141.05
HOCU	28.00	10.48	9.04	17.80	0.40	-	37.72
SAME	14.00	5.24	2.27	4.00	1.00	1.00	13.51
STPU	-	-	-	22.75	8.00	-	30.75
TOTAL	303.10	114.07	151.70	152.31	45.11	171.31	634.50

* HMP species

Active restoration was conducted at HA 26 in 2018, 2019, and 2020. The total number of plants installed at HA 26 was 9,833 compared to 9,845 prescribed in the SSRP. Three distinct areas at HA 26 received active restoration. Shrubs installed in Target Areas 1 and 2 receive supplemental irrigation throughout the dry season (see Section 8). Planting amounts by year and species, in comparison to the SSRP target, are presented for each area in Tables 9-33 through 9-35.

Burleson conducted active restoration at HA 26 Target Area 1 in 2019 and 2020. The total number of plants installed was 3,278 compared to 3,320 prescribed in the SSRP. Table 9-33 summarizes the plants installed during active restoration at Plot 1.

Table 9-33. Summary of Active Restoration Activities at Target Area 1 for HA 26

Species	Number of Individual Plants			
	SSRP Target Area 1	2019	2020	Total by Species
ACGL	400	-	175	175
ACMI	200	-	126	126
ADFA	175	200	134	334
ARCA	-	50	-	50
ARHO	-	157	-	157
ARPU*	175	-	125	125
ARMO	-	35	-	35
ARTO	175	40	138	178
BAPI	75	50	61	111
CERI*	175	100	125	225
CRSC	400	-	203	203
DIAU	350	-	125	125
ERCO	420	282	100	382
ERFA*	200	12	100	112
HOCU	400	125	175	300
LUAR	-	200	15	215
SAME	175	300	125	425
TOTAL	3,320	1,551	1,727	3,278

* HMP Species

Burleson conducted active restoration at HA 26 Target Area 2 in 2018. The total number of plants installed was 4,885 compared to 4,860 prescribed in the SSRP. Table 9-34 summarizes the plants installed during active restoration at Plot 2.

Table 9-34. 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)	Total by Species
ACGL	580	138	88	226
ACMI	250	289	-	289
ADFA	265	589	67	656
ARPU*	240	644	88	732
ARTO	265	319	69	388
BAPI	120	141	31	172
CERI*	240	290	92	382
CRSC	550	462	31	493
DIAU	480	189	153	342
ERCO	550	50	50	100
ERFA*	500	360	65	425
HOCU	580	271	88	359
LUAR	-	-	15	15
SAME	240	243	63	306
TOTAL	4,860	3,985	900	4,885

* HMP Species

Burleson conducted active restoration at HA 26 Target Area 3 in 2018. The total number of plants installed was 1,670 compared to 1,665 prescribed in the SSRP. Table 9-35 summarizes the plants installed during active restoration at Plot 3.

Table 9-35. Summary of Active Restoration Activities at Target Area 3 for HA 26

Species	Number of Individual Plants		
	SSRP Target Area 3	2018 (Jan)	Total by Species
ACGL	200	57	57
ACMI	50	125	125
ADFA	95	134	134
ARPU*	85	311	311
ARTO	100	138	138
BAPI	50	61	61
CERI*	85	124	124
CRSC	200	200	200
DIAU	200	125	125
ERCO	200	32	32
ERFA*	100	115	115
HOCU	200	123	123
SAME	100	125	125
TOTAL	1,665	1,670	1,670

* HMP Species

9.5.2 Monitoring Results

9.5.2.1 HMP Annual Density

Nine Monterey spineflower plots were surveyed for year 5 density at HA 26 in 2020. The plots are numbered 1-9 on Figure 9-28 and are located throughout the site. Monterey spineflower density was low at Plots 1, 2, 3, 4, 5, 6, and 9, and was not present at Plot 7 and 8. Figure 9-27 summarizes all the Monterey spineflower restoration plot densities for HA 26.

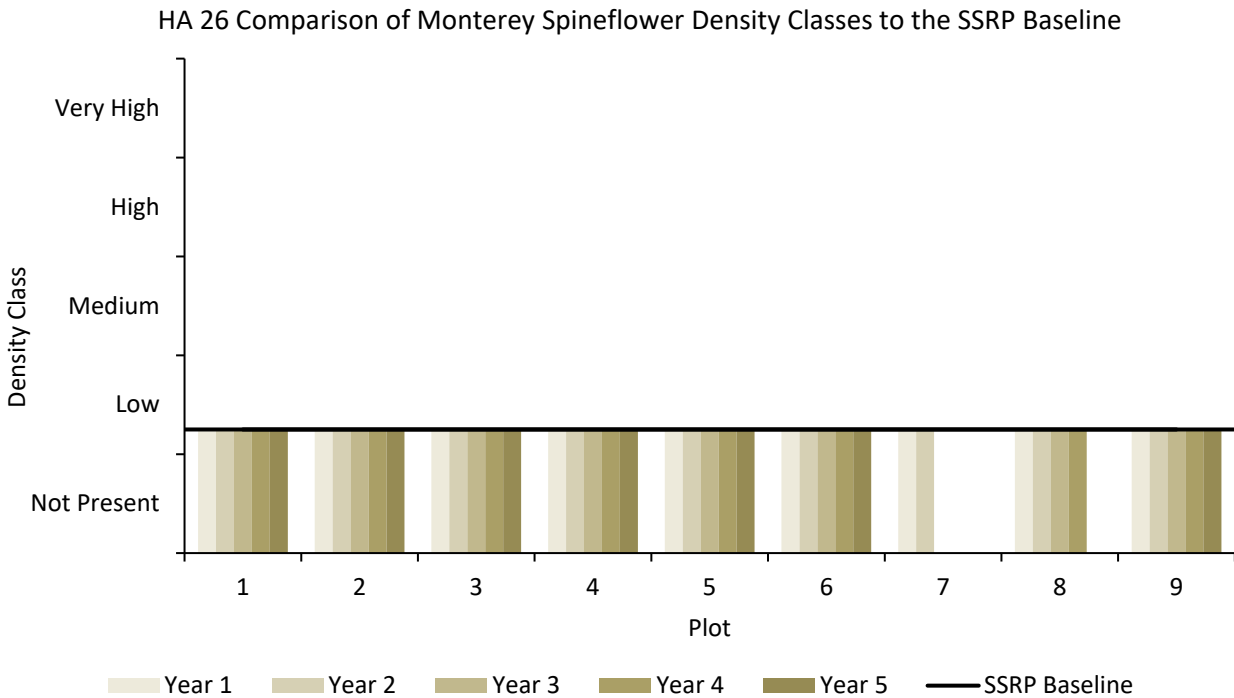


Figure 9-27. HA 26 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-9

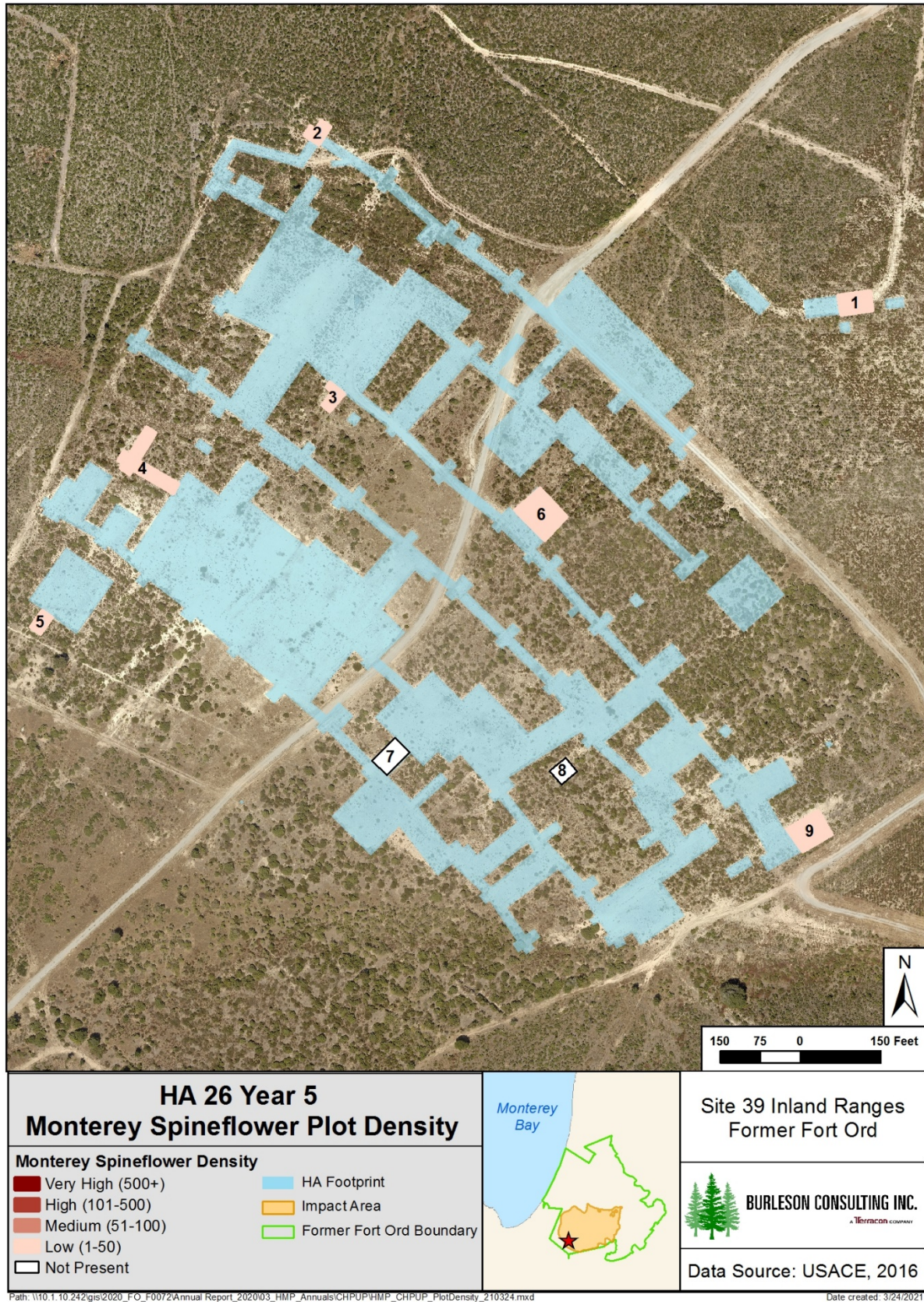


Figure 9-28. HA 26 Year 5 Monterey Spineflower Plot Density Map

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 Monterey spineflower and seaside bird's beak at HA 26.

Forty-four individual plants and four discrete patches of Monterey spineflower were mapped and individual plants were counted within each patch (see Figure 9-29). 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 0.02 acre. From 2019 to 2020, the density range remained the same and acreage above the SSRP baseline decreased.

Three discrete patches of seaside bird's beak were mapped and individual plants were counted within each patch (see Figure 9-30). The density was low and the total acreage of seaside bird's beak patches with a density at or above a density class of low was 0.02 acre. Densities and acreages were not calculated in 2019 because no discrete patches were observed. Seaside bird's beak is not an SSRP required species at HA 26.

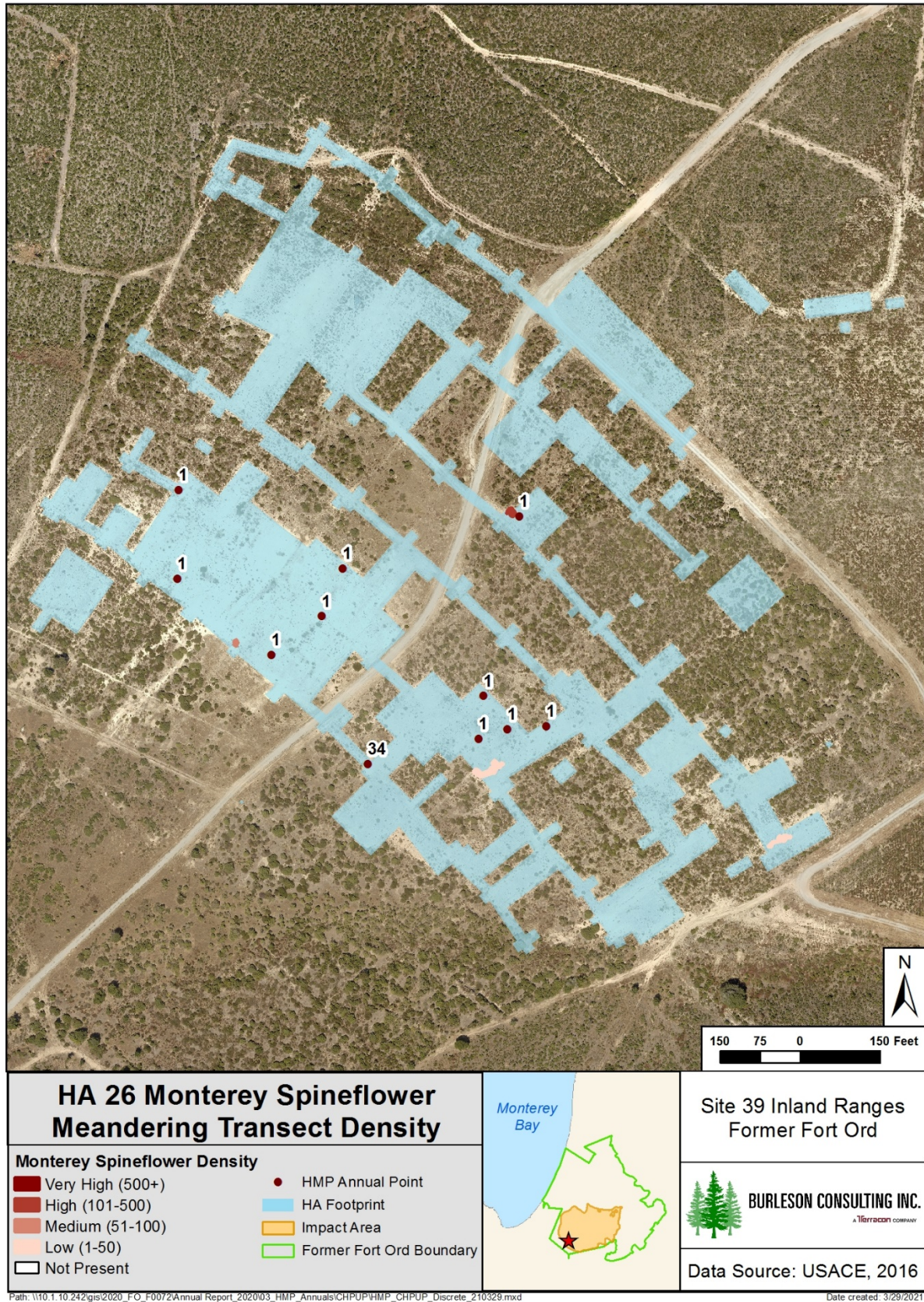


Figure 9-29. HA 26 Monterey Spineflower Meandering Transect Density Map

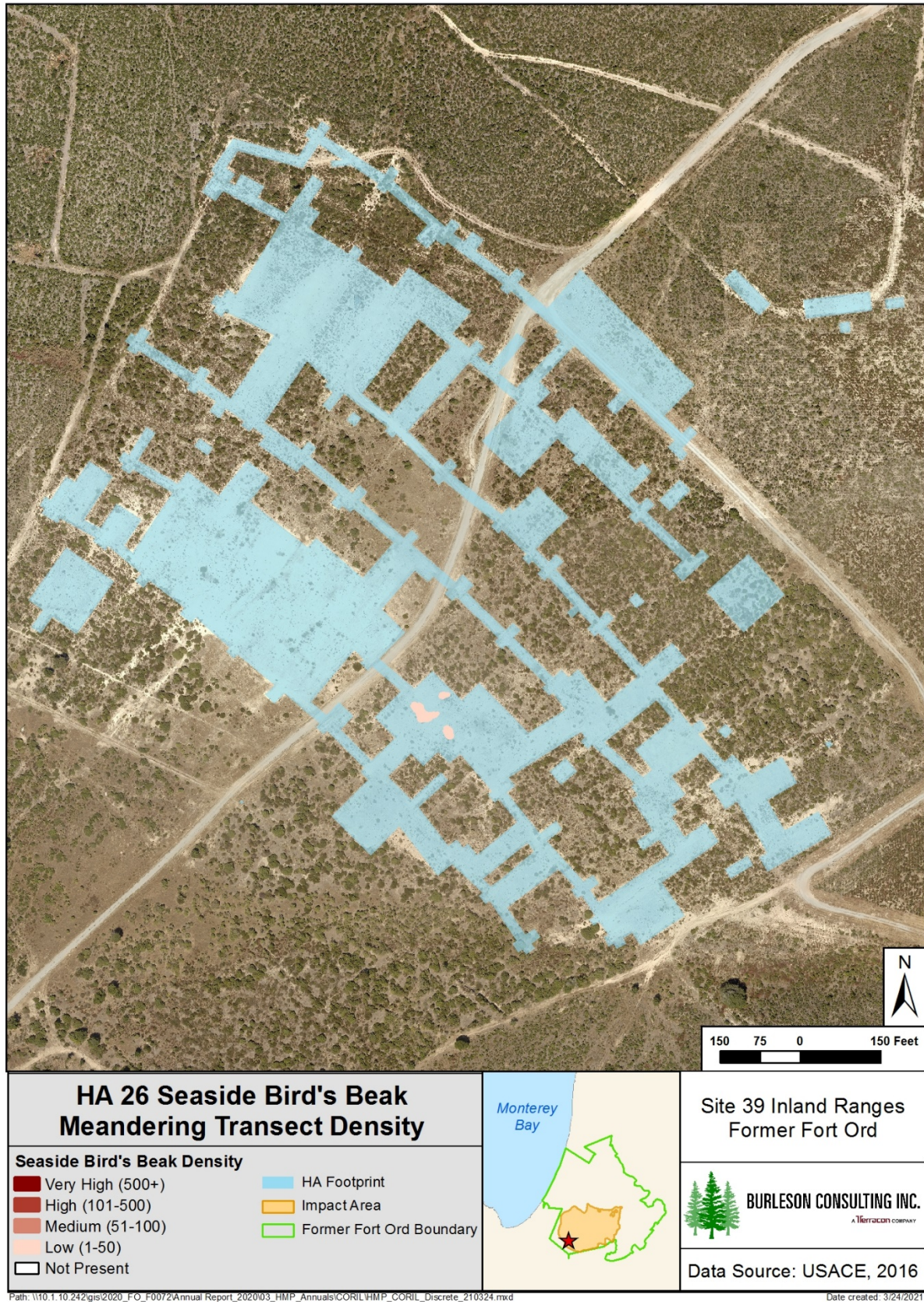


Figure 9-30. HA 26 Seaside Bird's Beak Meandering Transect Density Map

9.5.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 26 for plants installed in 2018, 2019, and 2020. A total of eight shrub species and 523 individual plants were monitored for survivorship. In the 2018 and 2019 plantings, there are irrigated and non-irrigated plants. In the 2020 planting, all plants are non-irrigated. By the end of year 3 monitoring for the 2018 planting, survivorship was 73%; survivorship decreased slightly from 74% in 2019. By the end of year 2 monitoring for the 2019 planting, survivorship was 74%. By the end of year 1 monitoring for the 2020 planting, survivorship was 74%. Tables 9-36 through 9-38 present results by species.

Table 9-36. 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 9-37. Plant Survivorship Monitoring Summary for 2019 Plantings at HA 26

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

* HMP Species

Table 9-38. Plant Survivorship Monitoring Summary for 2020 Plantings at HA 26

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2020)
			Alive (%)
ADFA	134	13	92
ARPU*	125	13	100
ARTO	138	14	100
BAPI	61	10	100
CERI*	125	13	46
ERFA*	100	10	40
LUAR	15	10	0
SAME	125	13	92
Total	823	96	74

* HMP Species

9.5.2.3 Species Richness

Seventy-one species were observed at HA 26. Of those, 31 were native shrubs or perennials, 13 were native annual herbaceous species, 26 were non-native species, and one was not categorized as it was only identified to genus (see Table 9-39). Species richness decreased by ten since 2019. Native shrub and perennial species richness decreased by two, native herbaceous species richness decreased by two, non-native species richness decreased by five, and uncategorized species richness decreased by one.

Table 9-39. Species Observed on HA 26, 2020

Scientific Name	Common Name	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon heermannii</i> var. <i>orbicularis</i>	Heermann's lotus	ACHEO	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophyllea</i>	silver hair grass	AICA	NNF
<i>Arbutus menziesii</i>	Pacific madrone	ARME	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Briza maxima</i>	rattlesnake grass	BRMA	NNF
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Carduus pycnocephalus</i> ssp. <i>pycnocephalus</i>	Italian thistle	CAPYP	NNF
<i>Carex</i> sp.	sedge	CA	NP
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Centaurea melitensis</i>	totalote	CEME	NNF
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Cistus incanus</i>	rock-rose	CIIN	NNP
<i>Conium maculatum</i>	poison hemlock	COMA	NNP

Table 9-39. Species Observed on HA 26, 2020

Scientific Name	Common Name	Code	Category
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> *	seaside bird's-beak	CORIL	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crassula connata</i>	pygmy-weed	CRCO	NF
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Erigeron canadensis</i>	horseweed	ERCA	NF
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Gastridium phleoides</i>	nit grass	GAPH	NNF
<i>Heteromeles arbutifolia</i>	toyon	HEAR	NP
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Lepechinia calycina</i>	pitcher sage	LECA	NP
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA	NP
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Madia exigua</i>	little tarweed	MAEX	NF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Nuttallanthus texanus</i>	blue toadflax	NUTE	NF
<i>Petrorhagia dubia</i>	hairypink	PEDU	NNF
<i>Pinus radiata</i>	Monterey pine	PIRA	NP
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	POMO	NNF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium</i> sp.	cudweed	PS	
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Senecio sylvaticus</i>	woodland groundsel	SESY	NNF
<i>Silene gallica</i>	small-flower catchfly	SIGA	NNF
<i>Sonchus asper</i>	prickly sow thistle	SOAS	NNF
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN	NNF
<i>Trifolium hirtum</i>	rose clover	TRHI	NNF
<i>Zeltnera davyi</i>	Davy's centaury	ZEDA	NF

* HMP species

9.5.2.4 Vegetative Cover

Burleson completed 14 50-meter line-intercept transects at HA 26. Seven additional transects were installed, six in active restoration areas and one in passive restoration areas, prior to 2019 monitoring. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 29.75%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2019 by 4.38%. Table 9-40 summarizes vegetative cover and Table 9-41 presents vegetative cover by species. Figure 9-31 presents the percent cover of dominant species at HA 26 in 2017, 2018, 2019, and 2020.

Table 9-40. Transect Survey Summary for HA 26

Transect ID	Restoration Type	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA26T01	Passive	40.68	40.68	0.00	52.38	44.46
HA26T02	Passive	43.30	43.10	0.20	57.48	39.36
HA26T03	Passive	15.42	15.42	0.00	30.46	64.32
HA26T04	Passive	17.82	17.82	0.00	28.02	61.54
HA26T05	Passive	21.66	21.66	0.00	35.38	60.60
HA26T06	Passive	35.52	34.36	1.16	53.66	42.30
HA26T07	Passive	33.44	33.44	0.00	70.84	26.36
HA26T08	Active	26.02	26.02	0.00	81.10	18.02
HA26T09	Active	49.30	49.30	0.00	84.68	14.02
HA26T10	Active	17.00	16.74	0.26	100.00	0.00
HA26T11	Active	28.72	27.32	1.40	71.24	26.16
HA26T12	Active	11.42	11.22	0.20	100.00	0.00
HA26T13	Active	35.22	35.22	0.00	71.96	28.54
HA26T14	Passive	44.18	44.18	0.00	61.00	34.88
Passive Transect Average		31.50	31.33	0.17	48.65	46.73
Active Transect Average		27.95	27.64	0.31	84.83	14.46
SITE AVERAGE		29.98	29.75	0.23	64.16	32.90

Table 9-41. Transect Survey Results for HA 26 by Species

Transect	ACGL (%)	ACMI (%)	ADFA (%)	AICA (%)	ARPU* (%)	ARTO (%)	BAPI (%)	CA (%)	CEDE (%)	CERI* (%)	COFI (%)	COJU (%)
HA26T01	2.96	0.00	0.00	0.00	0.00	3.82	0.00	0.46	20.32	0.00	0.00	0.00
HA26T02	1.00	0.00	1.56	0.00	0.00	11.30	0.20	0.28	13.24	0.42	0.00	0.00
HA26T03	2.76	0.00	0.00	0.00	0.00	3.28	0.00	0.24	2.14	2.20	0.00	0.00
HA26T04	0.40	0.00	0.00	0.00	0.00	3.90	0.00	0.72	9.58	0.00	0.00	0.00
HA26T05	0.84	0.00	0.00	0.00	8.60	0.68	0.00	0.00	7.16	0.00	0.00	0.00
HA26T06	5.20	0.00	0.00	0.46	0.00	3.86	0.00	0.24	13.30	2.52	0.00	0.70
HA26T07	1.22	0.00	0.00	0.00	0.00	4.10	0.00	0.00	19.98	0.00	0.00	0.00
HA26T08	0.34	0.44	0.00	0.00	0.00	2.52	0.00	0.00	4.52	0.00	0.00	0.00
HA26T09	5.42	0.00	0.86	0.00	2.08	1.72	0.00	0.20	27.32	0.00	0.00	0.00
HA26T10	2.12	0.00	1.14	0.00	4.62	2.92	3.22	0.00	0.00	0.00	0.00	0.00
HA26T11	0.00	0.00	1.36	0.00	2.16	10.70	0.00	0.00	7.88	0.00	0.76	1.40
HA26T12	4.04	0.00	1.30	0.00	2.84	1.20	0.00	0.00	0.00	1.84	0.00	0.00
HA26T13	1.92	0.00	0.00	0.00	1.24	1.32	0.00	0.00	18.28	0.84	0.00	0.00
HA26T14	0.96	0.00	0.00	0.00	0.00	9.98	2.10	0.00	17.26	0.00	0.00	0.00
SITE AVERAGE	2.08	0.03	0.44	0.03	1.54	4.38	0.39	0.15	11.50	0.56	0.05	0.15

Table 9-41 (continued). Transect Survey Results for HA 26 by Species

Transect	CRSC (%)	DIAU (%)	ERBO (%)	ERFA* (%)	HOCU (%)	LECA (%)	LYAR (%)	NAHAP (%)	SAME (%)	TODI (%)	TH (%)	BG (%)
HA26T01	7.44	0.00	0.00	0.00	5.48	0.00	0.00	0.20	0.00	0.00	52.38	44.46
HA26T02	6.16	0.00	0.00	0.00	5.82	0.48	0.20	0.00	2.08	0.56	57.48	39.36
HA26T03	1.78	0.00	0.00	0.00	3.02	0.00	0.00	0.00	0.00	0.00	30.46	64.32
HA26T04	0.32	0.00	0.00	0.48	2.42	0.00	0.00	0.00	0.00	0.00	28.02	61.54
HA26T05	3.26	0.00	0.00	0.00	1.12	0.00	0.00	0.00	0.00	0.00	35.38	60.60
HA26T06	6.82	0.00	0.00	0.00	1.40	0.00	0.00	0.00	0.00	1.02	53.66	42.30
HA26T07	6.10	0.00	0.00	0.00	2.04	0.00	0.00	0.00	0.00	0.00	70.84	26.36
HA26T08	17.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.00	81.10	18.02
HA26T09	9.40	0.00	0.00	0.00	2.30	0.00	0.00	0.00	0.00	0.00	84.68	14.02
HA26T10	0.00	1.22	0.26	0.00	1.50	0.00	0.00	0.00	0.00	0.00	100.00	0.00
HA26T11	4.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	71.24	26.16
HA26T12	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00
HA26T13	9.86	0.38	0.00	0.40	0.98	0.00	0.00	0.00	0.00	0.00	71.96	28.54
HA26T14	7.20	0.00	0.00	0.00	6.68	0.00	0.00	0.00	0.00	0.00	61.00	34.88
SITE AVERAGE	5.70	0.11	0.03	0.06	2.43	0.03	0.01	0.01	0.15	0.11	64.16	32.90

* HMP species

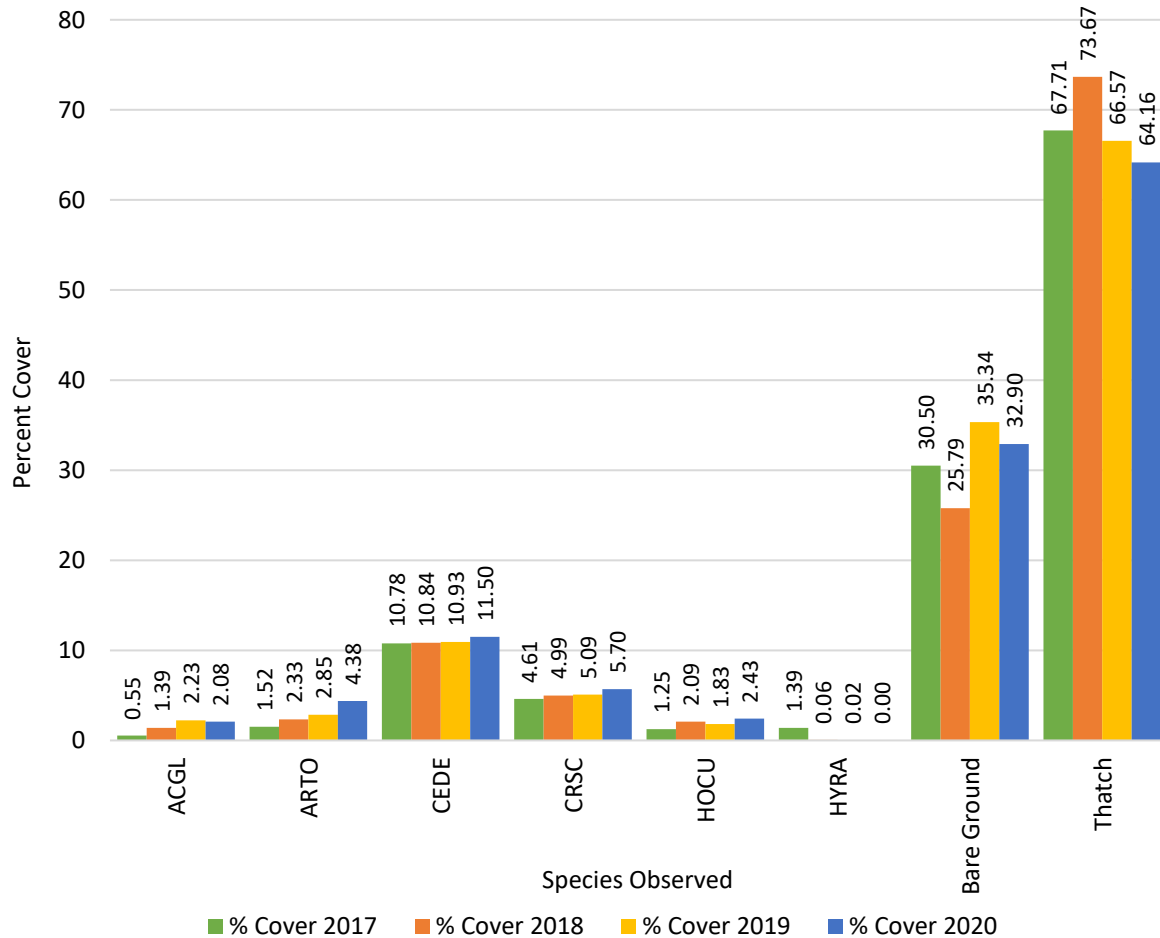


Figure 9-31. Percent Cover of Dominant Species at HA 26 in 2017, 2018, 2019, and 2020.

9.5.3 Discussion

9.5.3.1 Recommendations

HA 26 was in year 5 of monitoring in 2020. The site met three of six success criteria by 2020. The site was broadcast seeded and planted in 2020; no corrective measures are recommended at this time since restoration activities are not complete. Additional SSRP prescribed planting will be conducted in the 2020/2021 and 2021/2022 seasons. Monitoring HA 26 once the SSRP prescription is complete will guide future corrective measures. HMP shrub species, especially Monterey ceanothus and Eastwood's goldenbush, will continue to be monitored for survivorship and HMP shrub cover. Overall, HA 26 needs time to respond to the restoration effort and continued monitoring to evaluate areas that require additional effort. A qualitative overview was documented by photo points (see Appendix D, page D-5 and Appendix E, E-1).

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 8, 2023 (see Table 9-30). Table 9-42 summarizes the current status of HA 26 including which success criteria were met and recommendations.

Table 9-42. Status and Recommendations for Achieving Success Criteria at HA 26

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Plant SSRP species* (scheduled 2020/2021 and 2021/2022)
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Plant SSRP species* (scheduled 2020/2021 and 2021/2022)
Objective 3 – No. 4	HMP shrub cover by species	No	Plant SSRP species* (scheduled 2020/2021 and 2021/2022) Continue to irrigate HMP* shrubs (scheduled 2021)
Objective 3 – No. 4	HMP annual density	Yes	None

* Recommendation repeated from the 2018 Annual Habitat Restoration Report (Burleson, 2019a).

9.5.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 26. The SSRP baseline density class for Monterey spineflower was low. Year 5 Monterey spineflower restoration plot results show that seven out of nine plot densities met the success criterion. In addition, Monterey spineflower was present outside the restoration plots. Discrete patches, with density that met or exceeded the success criterion, covered 0.02 acre of HA 26.

Although not part of the success criterion, seaside bird's beak was present at HA 26. Seaside bird's beak covered 0.02 acre at low density.

9.5.3.3 Plant Survivorship

Overall plant survivorship was moderate for the 2018, 2019, and 2020 planting events at HA 26. Chamise, sandmat manzanita, shaggy-bark manzanita, and coyote brush had high survivorship for all planting events. Black sage had low survivorship in the 2018 planting event and high survivorship for the 2019 and 2020 planting events. Monterey ceanothus had low survivorship in the 2018 and 2020 planting events and moderate survivorship in the 2019 planting event. Eastwood's goldenbush had low survivorship for all planting events. Yellow bush lupine (*Lupinus arboreus*) was not planted in the 2018 planting event and had low survivorship in the 2019 and 2020 planting events. It is not surprising that yellow bush lupine and Monterey ceanothus had low survivorship since these species did poorly at multiple sites. HA 26 lacks top soil and has fine, silty soil which contributes to sheet flow and inhibits water infiltration. Several areas at HA 26 were mulched which should prevent erosion and help with water retention (Kemron, 2018). Survivorship will be monitored for one more year for the 2019 planting and two more years for the 2020 planting.

9.5.3.4 Species Richness

Chamise, sandmat manzanita, shaggy-bark manzanita, Monterey ceanothus, sticky monkeyflower, Eastwood's goldenbush, and black sage were present. HA 26 included 31 native shrub and perennial species and met the success criterion for Objective 1.

9.5.3.5 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 16 shrub and perennial species presented in Table 2 of the HA 26 SSRP (Burleson, 2013). These species contributed 17.88% cover to the HA (see Figure 9-32).

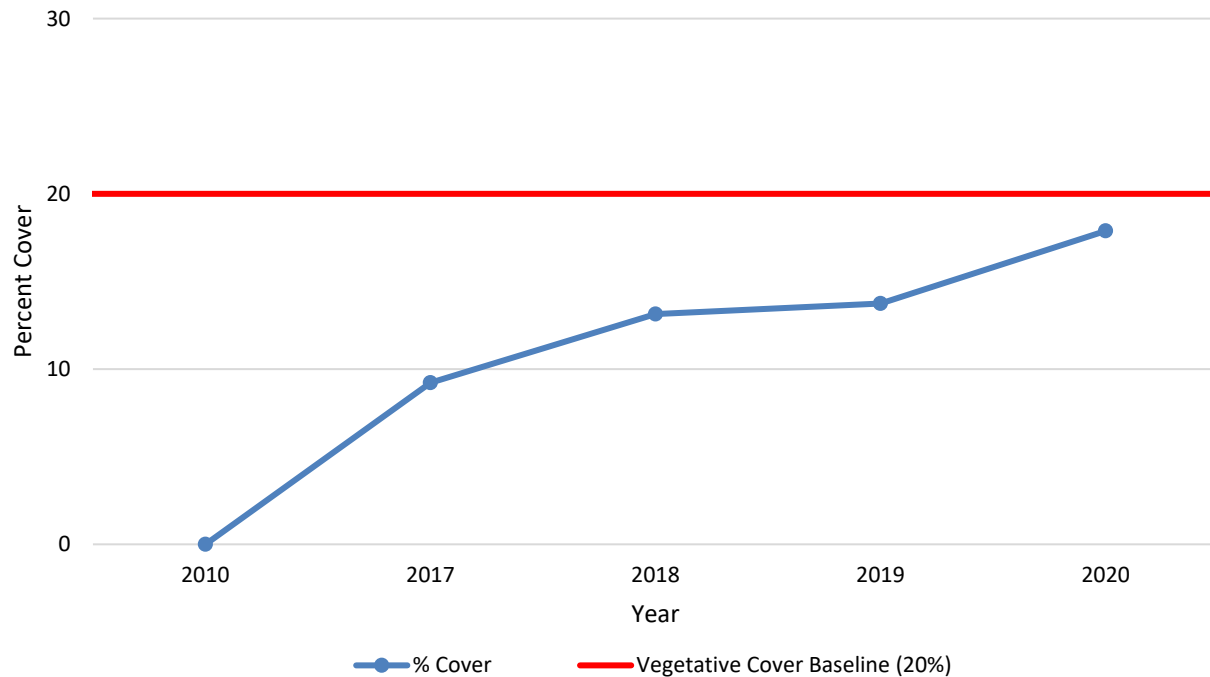


Figure 9-32. Native Vegetative Cover Compared to the Success Criterion at HA 26.

Objective 2 considers the percent cover of non-native target weeds. The transect surveys contained jubata grass (*Cortaderia jubata*); however, vegetative cover for non-native species was 0.15% which is less than the 5% acceptable limit.

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 26 provided an absolute cover of 2.16%; therefore, the HA did not meet this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 26, this means a vegetative cover average of at least 2% cover for sandmat manzanita and presence of Monterey ceanothus and Eastwood's goldenbush. The average vegetative cover for sandmat manzanita was 1.54%, Monterey ceanothus was 0.56%, and Eastwood's goldenbush was 0.06% (see Figure 9-33). In 2020, two of the three species, Monterey ceanothus and Eastwood's goldenbush, met the acceptable limit; therefore, the success criterion was not met.

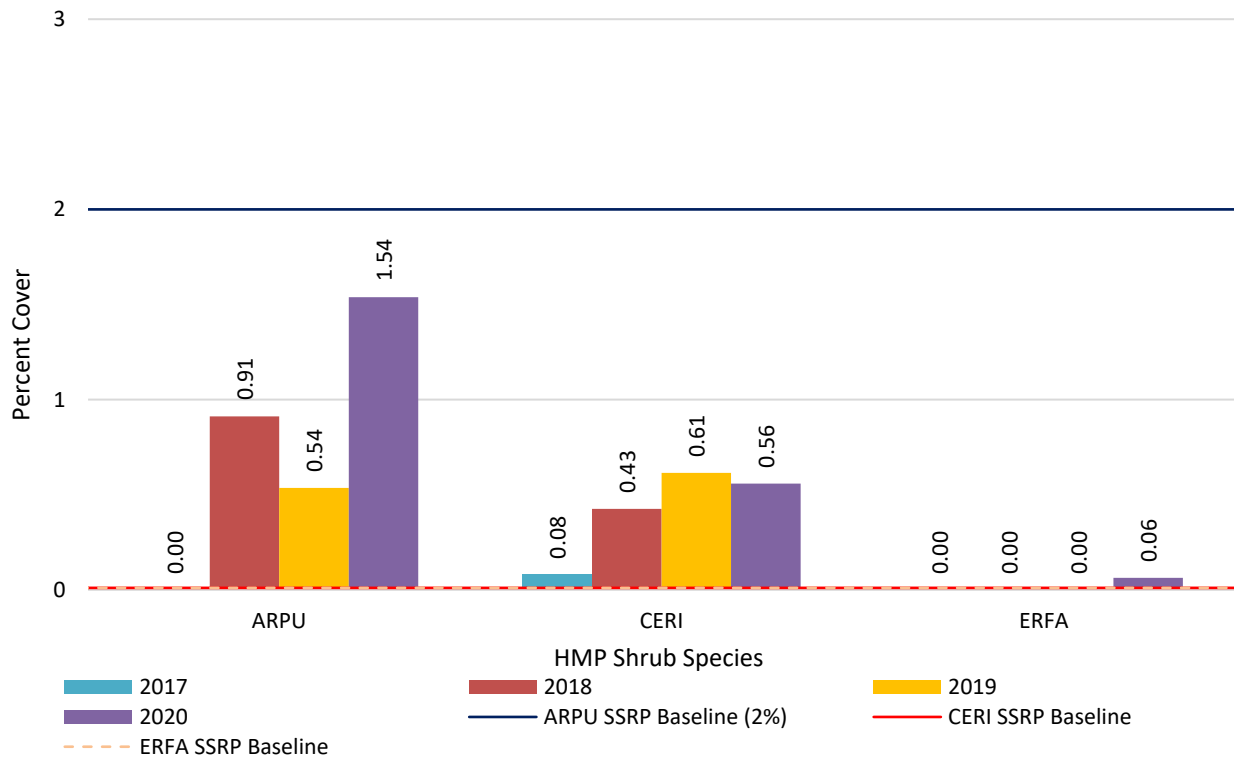


Figure 9-33. HMP Shrub Species Comparison to Success Criteria at HA 26

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 acre (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, and 2020 and monitoring began in 2013. HA 27 was monitored for ten years by photo documentation and site visits and four years for species richness and vegetative cover (see Table 9-43). Figure 9-34 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 27 are summarized in Table 9-44.

Table 9-43. Historic Summary of Restoration and Monitoring Activities at HA 27

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

* Photo points and site visits occur every year regardless of the monitoring year

† Vegetative cover was monitored using quadrats in 2016

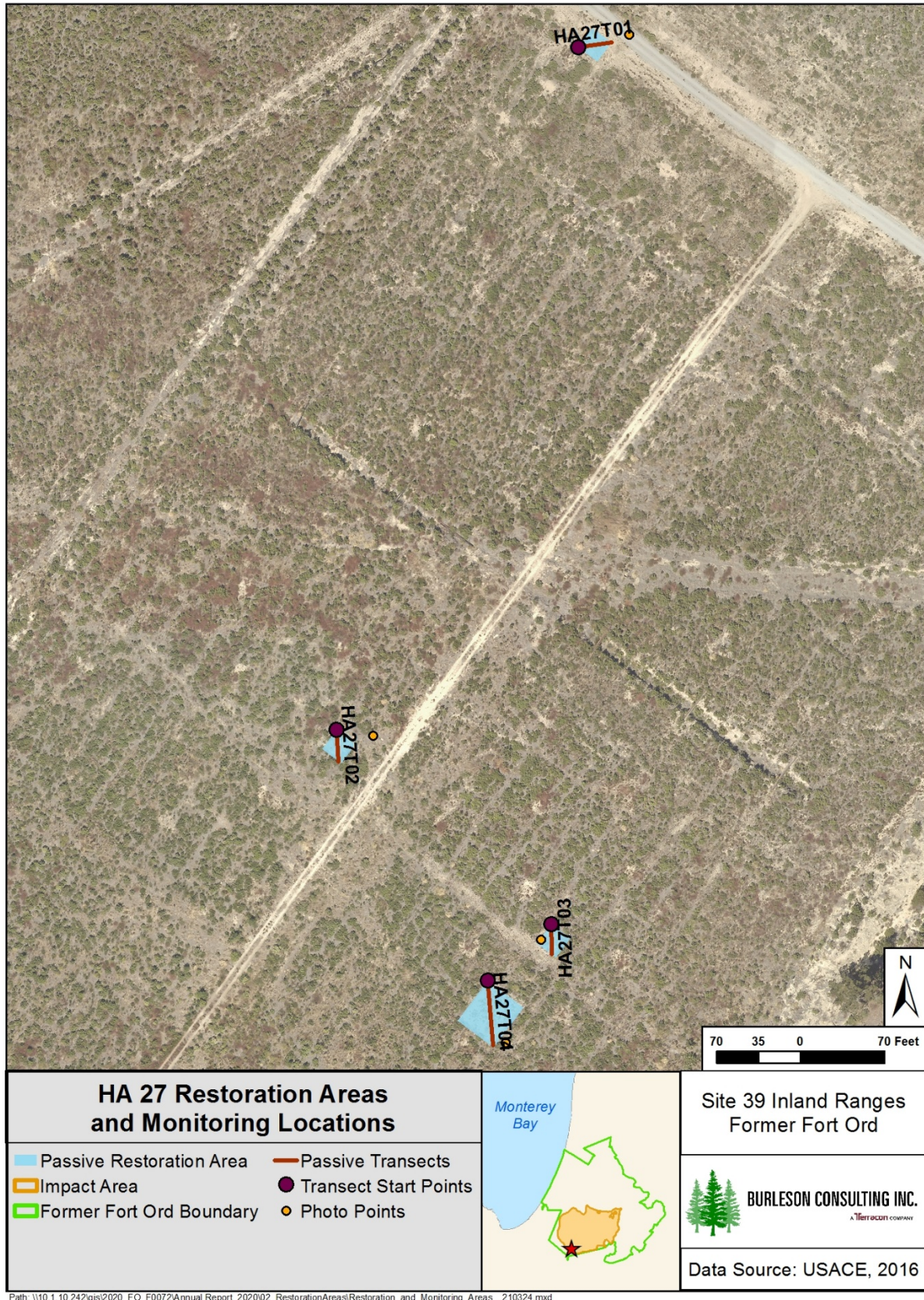


Figure 9-34. HA 27 Restoration Areas and Monitoring Locations Map

Table 9-44. 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
		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 9-44. 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. Table 9-45 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-45. 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, an AMP planting event occurred in 2019 per recommendations made in the 2018 Annual Report (Burleson, 2019a). A total of 44 plants were installed at HA 27 for this planting event. Table 9-46 summarizes the plants installed during active restoration.

Table 9-46. Summary of Active Restoration Activities for HA 27

Species	Number of Individual Plants	
	2019	Total by Species
ARMO*	20	20
DIAU	14	14
ERCO	10	10
TOTAL	44	44

*HMP species

9.6.2 Monitoring Results

9.6.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27. Therefore, no HMP annuals need to be present at this restoration site.

9.6.2.2 Plant Survivorship

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

9.6.2.3 Species Richness

Thirty-eight species were observed at HA 27. Of those, 21 were native shrubs or perennials, eight were native annual herbaceous species, eight were non-native species, and one was not categorized as it was only identified to genus (see Table 9-47). Species richness increased by 12 species since 2018. Native shrub and perennial species increased by two, native herbaceous species increased by five, non-native species increased by four, and uncategorized species increased by one.

Table 9-47. Species Observed on HA 27, 2020

Scientific Name	Common Name	Code	Category
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Carex</i> sp.	sedge	CA	NP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crassula connata</i>	pygmy-weed	CRCO	NF
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Gastridium phleoides</i>	nit grass	GAPH	NNF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Juncus bufonius</i> var. <i>occidentalis</i>	western toad rush	JUBUO	NP
<i>Lepechinia calycina</i>	pitcher sage	LECA	NP
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA	NNF
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Madia exigua</i>	little tarweed	MAEX	NF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Pinus radiata</i>	Monterey pine	PIRA	NP

Table 9-47. Species Observed on HA 27, 2020

Scientific Name	Common Name	Code	Category
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium</i> sp.	cudweed	PS	
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Schismus barbatus</i>	old han schismus	SCBA	NNF
<i>Stylocline gnaphaloides</i>	everlasting neststraw	STGN	NF

* HMP species

9.6.2.4 Vegetative Cover

Burleson completed four line-intercept transects ranging from eight to 17 meters in length at HA 27. Survey results indicated that the mean vegetative cover by native shrubs and perennials was 41.74%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2018 by 0.31%. Table 9-48 summarizes vegetative cover and Table 9-49 presents vegetative cover results by species. Figure 9-35 presents the percent cover of dominant species at HA 27 in 2017, 2018, and 2020.

Table 9-48. Transect Survey Summary for HA 27

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA27T01	83.22	83.22	0.00	87.67	11.56
HA27T02	11.75	11.75	0.00	88.88	11.12
HA27T03	20.25	20.25	0.00	72.12	27.88
HA27T04	44.00	44.00	0.00	80.00	17.47
SITE AVERAGE*	41.74	41.74	0.00	81.83	16.98

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

Table 9-49. Transect Survey Results for HA 27 by Species

Transect	ARMO* (%)	ARTO (%)	BAPI (%)	CEDE (%)	CERI* (%)	CRSC (%)	HOCU (%)	LECA (%)	SAME (%)	TH (%)	BG (%)
HA27T01	10.22	1.78	0.00	29.67	0.00	30.56	11.00	0.00	0.00	87.67	11.56
HA27T02	0.00	1.25	0.00	0.00	0.00	4.88	0.00	0.00	5.63	88.88	11.13
HA27T03	0.00	9.50	0.00	0.00	0.00	8.50	0.00	0.00	2.25	72.13	27.88
HA27T04	0.00	27.88	1.00	0.00	10.88	0.00	2.00	2.24	0.00	80.00	17.47
SITE AVERAGE†	2.19	13.71	0.40	6.36	4.40	9.10	3.17	0.90	1.50	81.83	16.98

* HMP Species

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

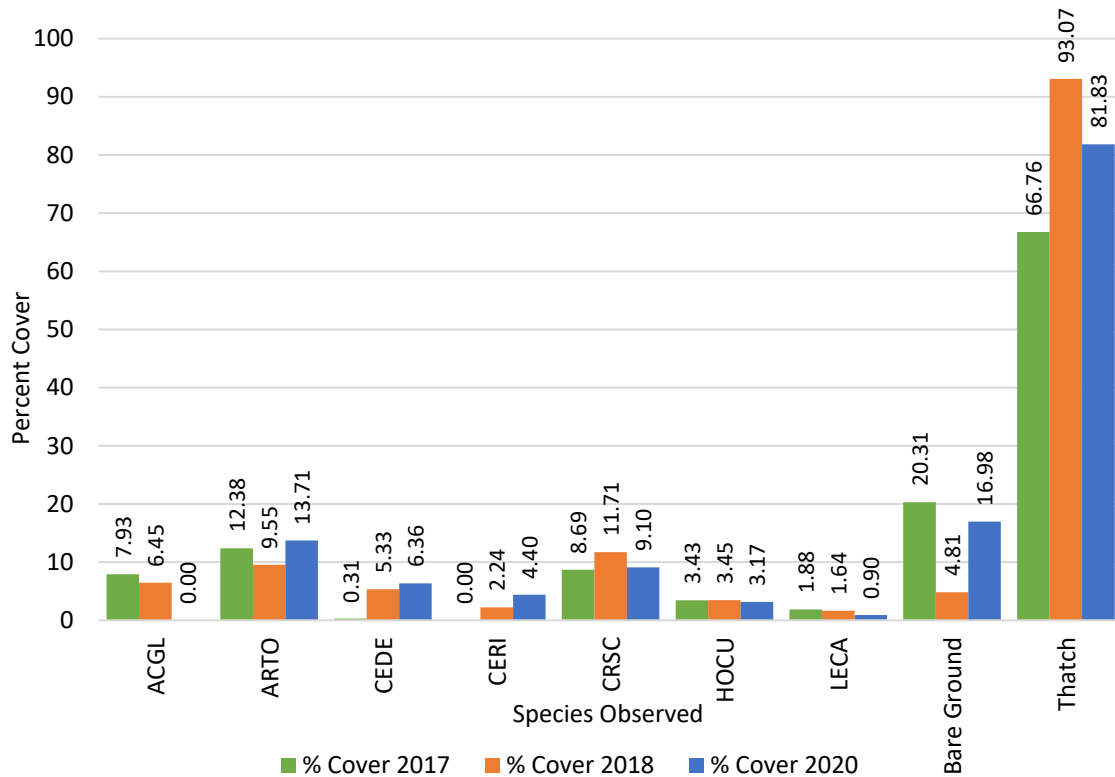


Figure 9-35. Percent Cover of Dominant Species at HA 27 in 2017, 2018, and 2020.

9.6.3 Discussion

9.6.3.1 Recommendations

HA 27 was in year 8 of monitoring in 2020. The site met two out of five success criteria by 2020. Per recommendations in the 2016 Annual Habitat Restoration Report, Monterey manzanita (*Arctostaphylos montereyensis*), golden yarrow, and sticky monkeyflower were planted in the 2018/2019 season to support native vegetation cover and HMP shrub cover criteria (Burlison, 2017). Additionally, the Army will plant sandmat manzanita to support the HMP shrub cover success criteria in the 2021/2022 season. The Army is considering planting additional sandmat manzanita to support achieving the high cover goal of 25%. Overall, HA 27 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-6 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, 2025 (see Table 9-43). Table 9-50 summarizes the current status of HA 27 including which success criteria were met and recommendations.

Table 9-50. Status and Recommendations for Achieving Success Criteria at HA 27

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Plant more native species* (scheduled 2021/2022)
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Plant sandmat manzanita* (scheduled 2021/2022) Plant additional sandmat manzanita†
Objective 3 – No. 4	HMP shrub cover by species	No	Plant sandmat manzanita* (scheduled 2021/2022) Plant additional sandmat manzanita†
Objective 3 – No. 4	HMP annual density	NA	NA

* Recommendation repeated from the 2016 Annual Habitat Restoration Report (Burleson, 2017).

† Not scheduled

9.6.3.2 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27. Therefore, no HMP annuals need to be present at this restoration site.

9.6.3.3 Plant Survivorship

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

9.6.3.4 Species Richness

Monterey manzanita, shaggy-bark manzanita, sandmat manzanita, coyote brush, Monterey ceanothus, peak rush-rose, sticky monkeyflower, golden yarrow, wedge-leaved horkelia (*Horkelia cuneata*), deerweed, and black sage were present. HA 27 included 21 native shrub and perennial species and met the success criterion for Objective 1.

9.6.3.5 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 10 shrub and perennial species presented in Table 2 of the HA 27 SSRP (Burleson, 2013). These species contributed 34.48% cover to the HA; therefore, this success criterion was not met (see Figure 9-36). In 2016, quadrats were completed to provide a preliminary idea of vegetative cover with a limited amount of effort. From 2017 onward, line-intercept transect surveys were used as multiple objectives outlined in the SSRP specifically require transect data. The 2016 quadrat data were not compared to the success criteria.

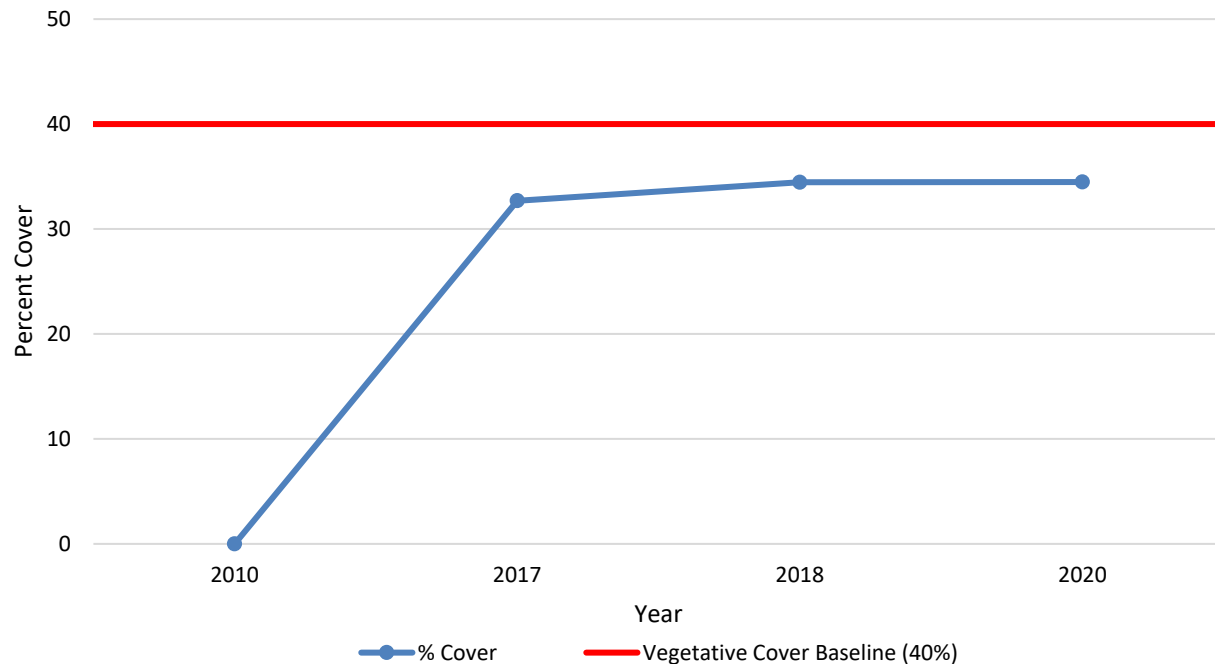


Figure 9-36. Native Vegetative Cover Compared to the Success Criterion at HA 27

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 4. Cover class 4 ranges from 26-50% of absolute cover. The HMP shrub species at HA 27 provided an absolute cover of 6.60%. HA 27 did not meet this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 27, this means a vegetative cover average of at least 25% cover for sandmat manzanita, at least 2% cover for Monterey manzanita, and at least 1% cover for Monterey ceanothus. The average vegetative cover for sandmat manzanita was 0.00%, Monterey manzanita was 2.19%, and Monterey ceanothus was 4.40% (see Figure 9-37). In 2020, two of the three species, Monterey manzanita and Monterey ceanothus, met the acceptable limit. Therefore, the success criterion was not met.

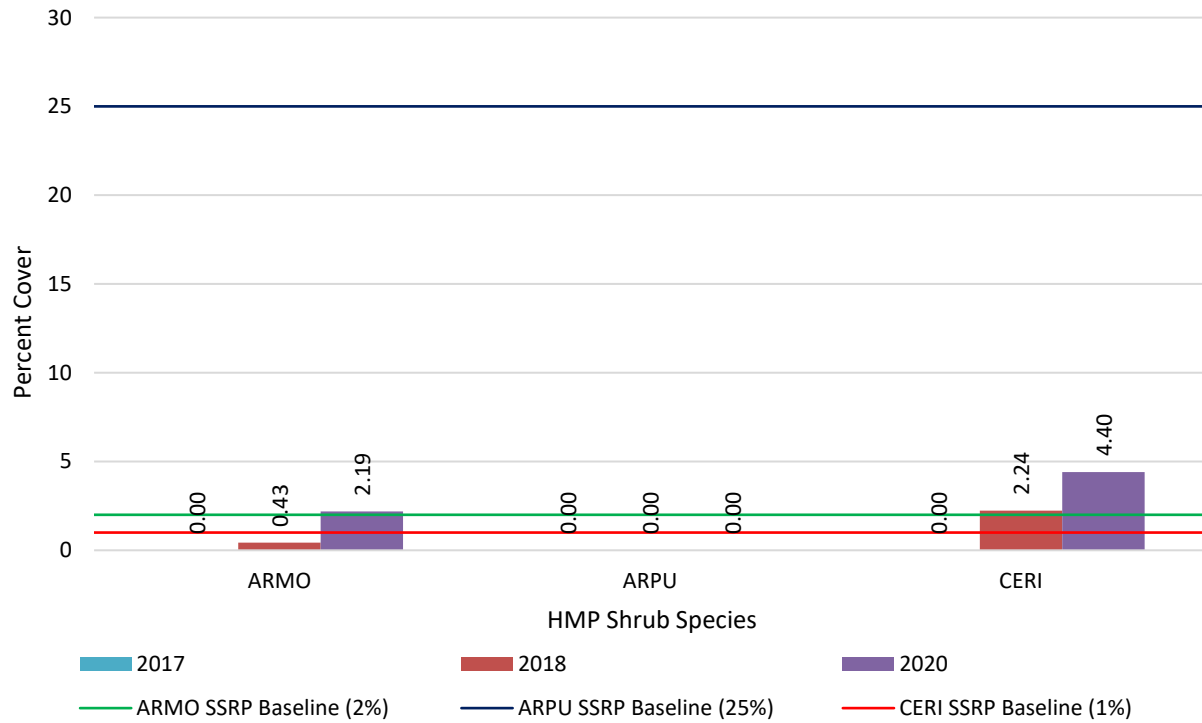


Figure 9-37. HMP Shrub Species Comparison to Success Criteria at HA 27

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 acre (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 top soil, 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, and 2020. Monitoring began in 2013. HA 27A was monitored for ten years by photo documentation and site visits and four years for species richness and vegetative cover (see Table 9-51). Figure 9-38 shows the HA footprint, passive restoration area, and transect locations. Success criteria for HA 27A are summarized in Table 9-52.

Table 9-51. Historic Summary of Restoration and Monitoring Activities at HA 27A

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

* Photo points and site visits occur every year regardless of the monitoring year

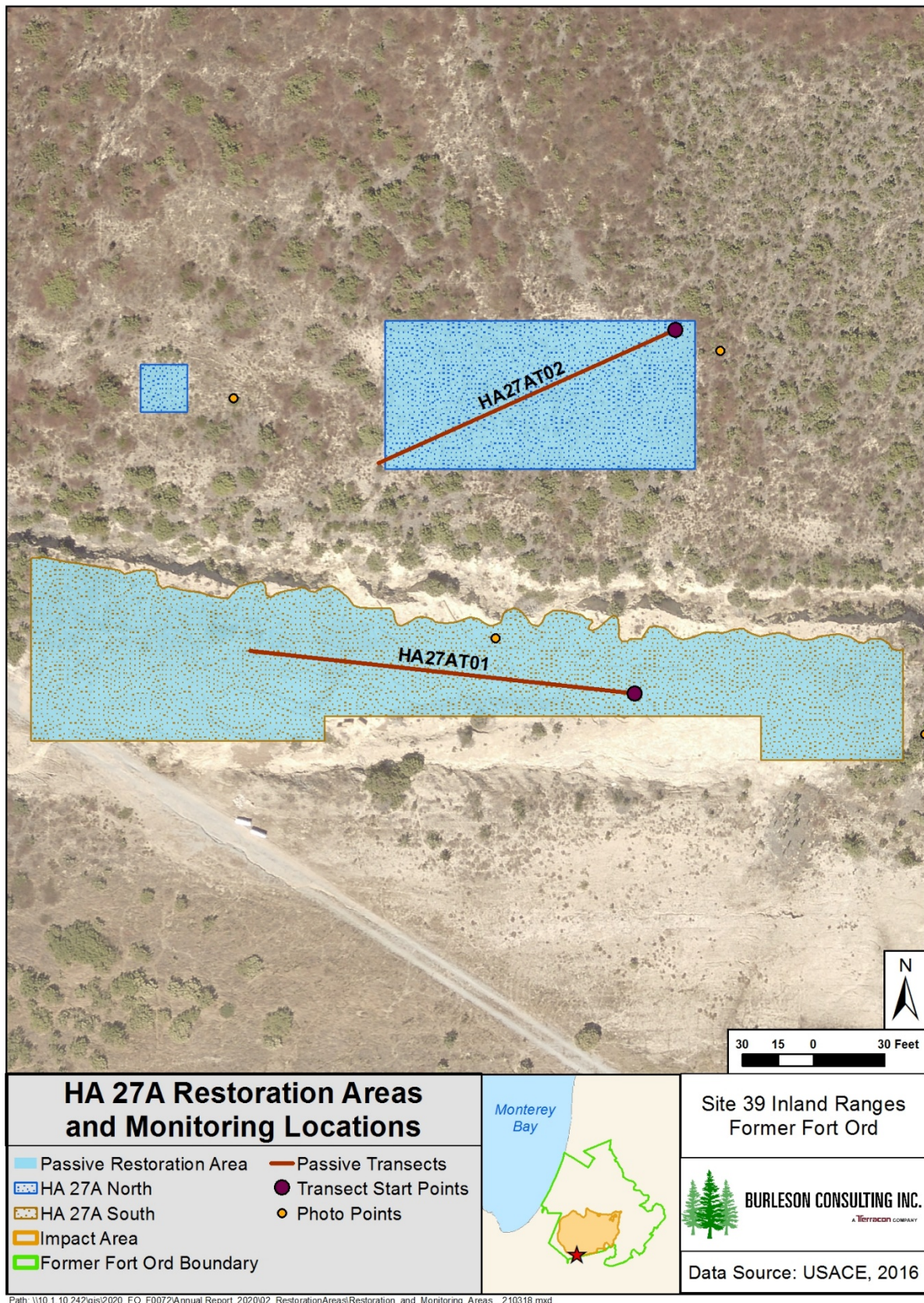


Figure 9-38. HA 27A Restoration Areas and Monitoring Location Map

Table 9-52. 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
		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 9-52. 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 9-53. 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)

† HMP Species

‡ Success criteria for HA 27A South updated by USFW (USFWS, 2019)

9.7.1 Restoration Activities

Burleson performed passive restoration in 2011, 2012, 2016, 2018, 2019, and 2020 throughout HA 27A North and South. The total amount of seed broadcast on site was 62.606 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. No active restoration activities were conducted at HA 27A. Table 9-54 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-54. Summary of Passive Restoration Activities for HA 27A

Species	Pounds of Seed Broadcast							Total by Species
	SSRP Target	2011	2012	2016	2018	2019	2020	
ACGL	1.200	0.600	0.608	0.800	-	-	2.000	4.008
ACMI	-	-	-	0.400	0.750	0.600	2.000	3.750
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	-	18.000
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	-	-	-	7.421
SAME	0.600	0.300	0.306	-	-	-	-	0.606
STPU	-	-	-	7.000	1.250	1.000	-	9.250
TOTAL	13.530	3.893	9.713	36.000	5.000	4.000	4.000	62.606

* HMP Species

9.7.2 HA 27A North Monitoring Results

9.7.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site.

9.7.2.2 Plant Survivorship

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

9.7.2.3 Species Richness

Twenty-six species were observed at HA 27A North. Of those, 14 were native shrubs or perennials, six were native annual herbaceous species, and six were non-native species (see Table 9-55). This is the first year that HA 27A North and South are being evaluated individually for species richness.

Table 9-55. Species Observed on HA 27A North, 2020

Scientific Name	Common Name	Code	Category
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophyllea</i>	silver hair grass	AICA	NNF
<i>Arbutus menziesii</i>	Pacific madrone	ARME	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP

Table 9-55. Species Observed on HA 27A North, 2020

Scientific Name	Common Name	Code	Category
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Carex sp.</i>	sedge	CA	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR	NF
<i>Navarretia hamata ssp. parviloba</i>	hooked navarretia	NAHAP	NF
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Salvia mellifera</i>	black sage	SAME	NP

* HMP species

9.7.2.4 Vegetative Cover

Burleson completed one 44-meter line-intercept transect at HA 27A North. The transect survey results indicated that the vegetative cover by native shrubs and perennials was 33.86%. Table 9-56 summarizes vegetative cover and Table 9-57 presents vegetative cover by species. Figure 9-39 presents the percent cover of dominant species at HA 27A North in 2017, 2018, and 2020.

Table 9-56. Transect Survey Summary for HA 27A North

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA27AT02	34.89	33.86	1.02	60.55	35.52
SITE AVERAGE	34.89	33.86	1.02	60.55	35.52

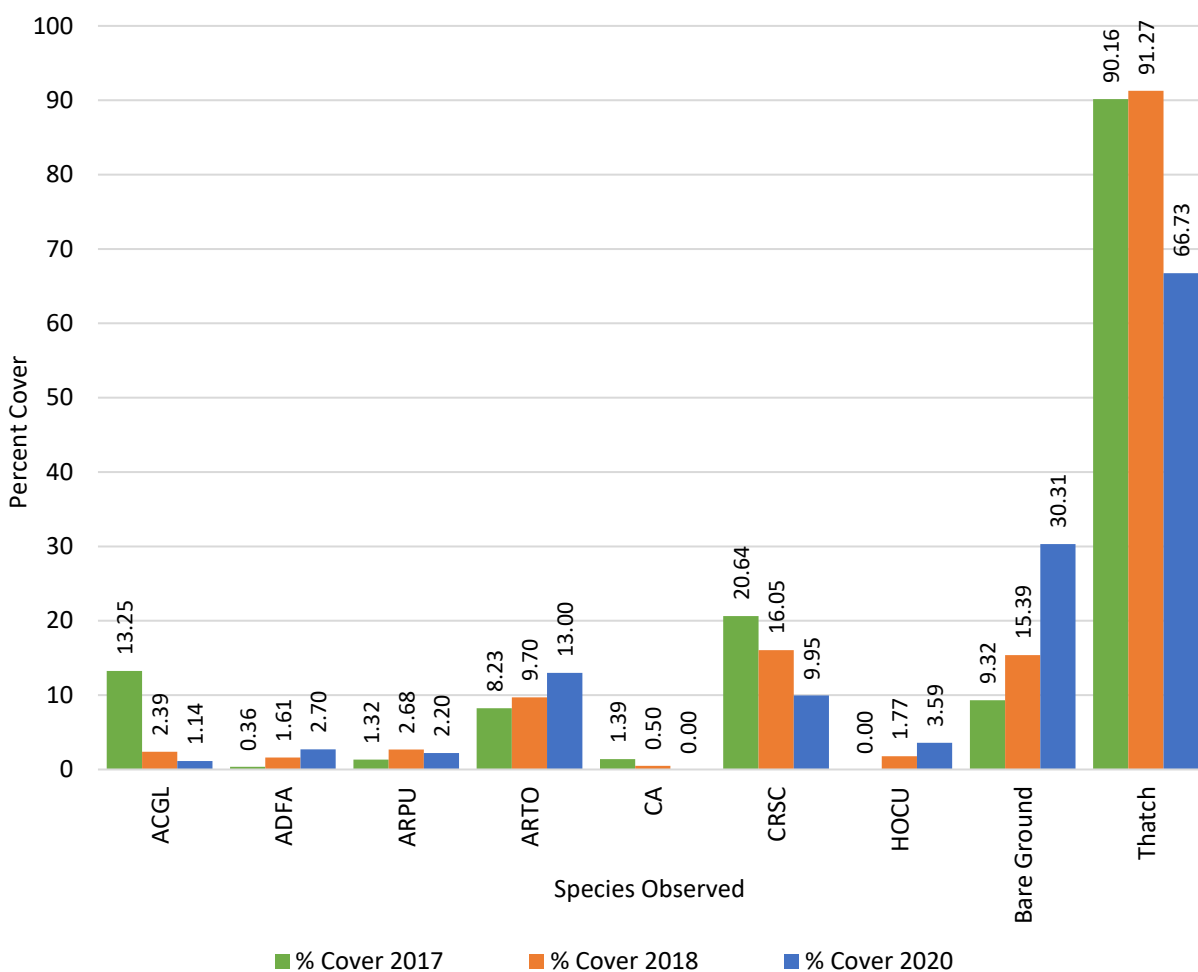
Table 9-57. Transect Survey Results for HA 27A North by Species

Transect	ACGL (%)	ADFA (%)	AICA (%)	ARME (%)	ARMO* (%)	ARPU* (%)
HA27AT02	1.14	2.70	1.02	0.68	0.59	2.20
SITE AVERAGE	1.14	2.70	1.02	0.68	0.59	2.20

Table 9-57 (continued). Transect Survey Results for HA 27A North by Species

Transect	ARTO (%)	CRSC (%)	HOCU (%)	TH (%)	BG (%)
HA27AT02	13.00	9.95	3.59	60.55	35.52
SITE AVERAGE	13.00	9.95	3.59	60.55	35.52

* HMP species

**Figure 9-39.** Percent Cover of Dominant Species at HA 27A North in 2017, 2018, and 2020.

9.7.3 HA 27A North Discussion

9.7.3.1 Recommendations

HA 27A North was in year 8 of monitoring in 2020. The site met two out of five success criteria by 2020. Per recommendations in the 2017 Annual Habitat Restoration Report, the Army has 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 are scheduled to be planted in the 2020/2021 season and Monterey manzanita will be 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 Table 9-58 and Sections 9.7.3.2 through 9.7.3.5. A qualitative overview was documented by photo points (see Appendix D, page D-7 and Appendix F, page F-5).

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 9-51). Table 9-58 summarizes the current status of HA 27A North including which success criteria were met and recommendations.

Table 9-58. Status and Recommendations for Achieving Success Criteria at HA 27A North

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Plant sandmat manzanita and Monterey ceanothus* (scheduled 2020/2021) Plant Monterey manzanita* (scheduled 2021/2022)
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Plant sandmat manzanita and Monterey ceanothus* (scheduled 2020/2021) Plant Monterey manzanita* (scheduled 2021/2022)
Objective 3 – No. 4	HMP shrub cover by species	No	Plant sandmat manzanita and Monterey ceanothus* (scheduled 2020/2021) Plant Monterey manzanita* (scheduled 2021/2022)
Objective 3 – No. 4	HMP annual density	NA	NA

* Recommendation repeated from the 2017 Annual Habitat Restoration Report (Burleson, 2018).

9.7.3.2 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site.

9.7.3.3 Plant Survivorship

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

9.7.3.4 Species Richness

At HA 27A North, chamise, Monterey manzanita, shaggy-bark manzanita, sandmat manzanita, coyote brush, Monterey ceanothus, golden yarrow, peak rush-rose, wedge-leaved horkelia, deerweed, sticky monkeyflower, and black sage were present. HA 27A North included 14 native shrub and perennial species and met the success criterion for Objective 1.

9.7.3.5 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 for HA 27A North. This list includes 13 shrub and perennial species presented in Table 2 of the HA 27A SSRP (Burleson, 2013). These species contributed 33.18% cover to the HA; therefore, this success criterion was not met. This is the first year that vegetative cover is being evaluated solely on data from the northern polygons. Data from past years has been reevaluated to be consistent with the new methodology (see Figure 9-40). The decrease in vegetative cover is due to the loss of cover from deerweed and peak rush-rose.

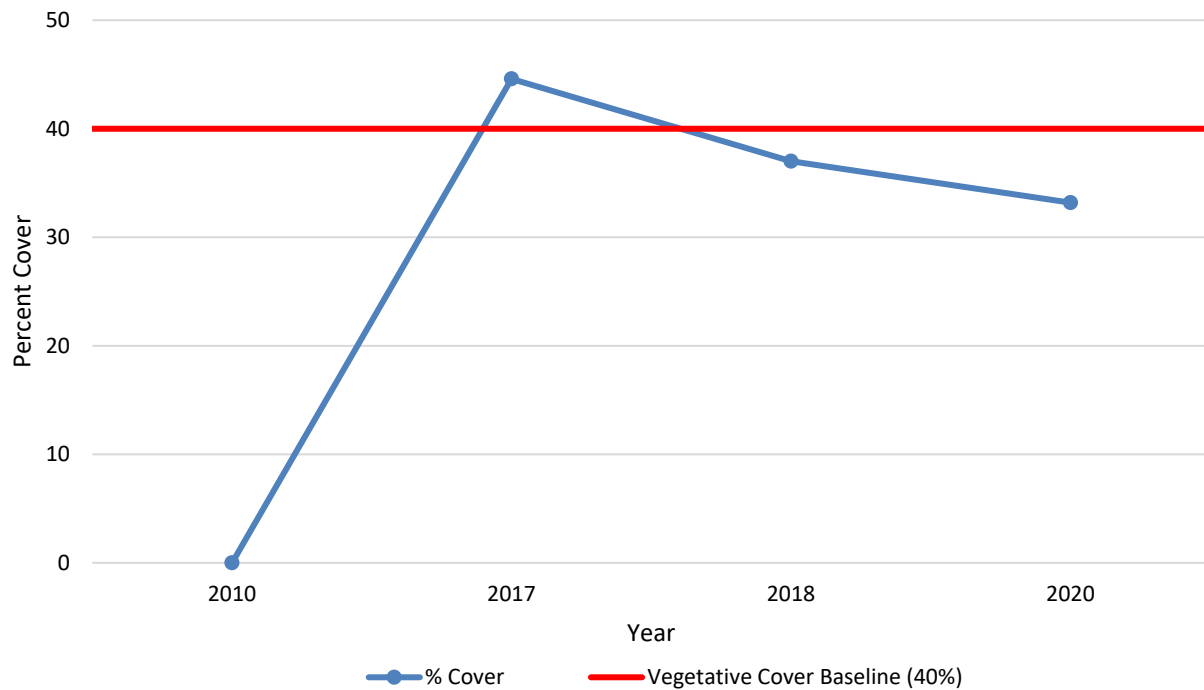


Figure 9-40. Native Vegetative Cover Compared to the Success Criterion at HA 27A North

Objective 2 considers the percent cover of non-native target weeds for HA 27A North. 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 for HA 27A North. The first is whether the HMP shrub cover class met or exceeded the baseline cover class of 4. Cover class 4 ranges from 26-50% of absolute cover. The HMP shrub species at HA 27A North provided an absolute cover of

2.80%, therefore the HA did not meet this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 27A North, this means a vegetative cover average of at least 25% cover for sandmat manzanita, 2% or greater for Monterey manzanita, and 1% or greater for Monterey ceanothus. The average vegetative cover for sandmat manzanita was 2.20%, Monterey manzanita was 0.59%, and Monterey ceanothus was 0.00% (see Figure 9-41). None of the species met the acceptable limit although they were present on the site; therefore, the success criterion was not met. This is the first year that HMP shrub cover class and no net loss of HMP shrubs are being evaluated solely on data from the northern polygons. Data from past years has been reevaluated to be consistent with the new methodology.

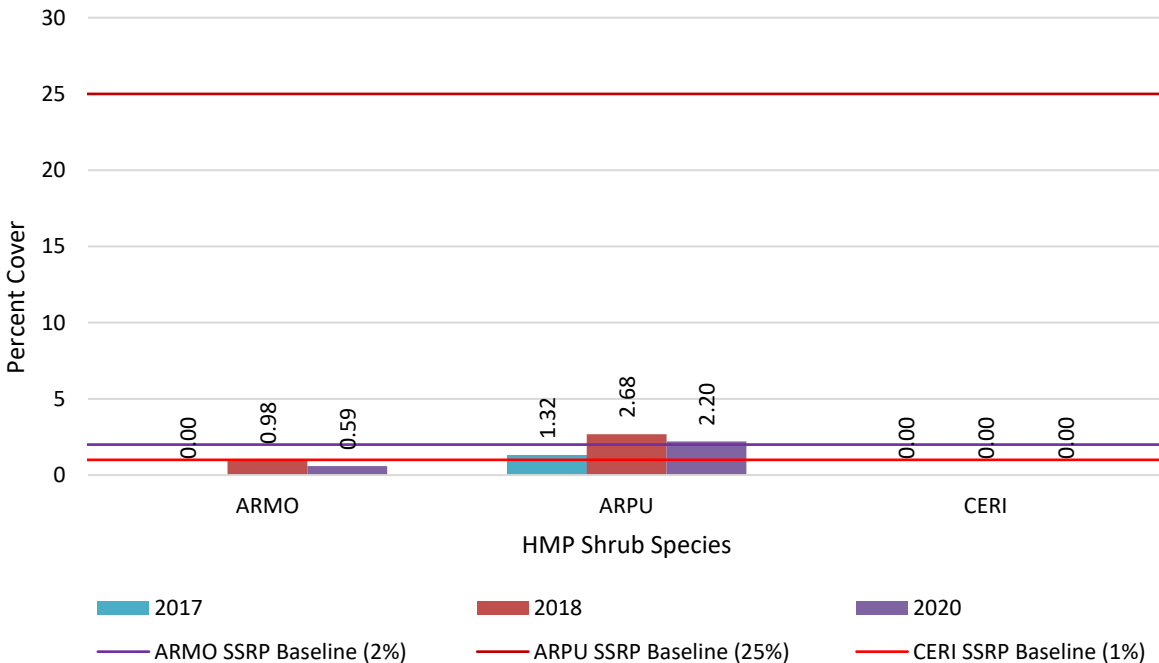


Figure 9-41. HMP Shrub Species Comparison to Success Criteria at HA 27A North

9.7.4 HA 27A South Monitoring Results

9.7.4.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site.

9.7.4.2 Plant Survivorship

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

9.7.4.3 Species Richness

Thirty-eight species were observed at HA 27A South. Of those, 21 were native shrubs or perennials, six were native annual herbaceous species, and eleven were non-native species (see Table 9-59). This is the first year that HA 27A North and South are being evaluated individually for species richness.

Table 9-59. Species Observed on HA 27A South, 2020

Scientific Name	Common Name	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon americanus</i> var. <i>americanus</i>	Spanish clover	ACAMA	NF
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Briza maxima</i>	rattlesnake grass	BRMA	NNF
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	winecup clarkia	CLPUQ	NF
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Juncus bufonius</i>	toad rush	JUBU	NF
<i>Juncus bufonius</i> var. <i>congestus</i>	clustered toad rush	JUBUC2	NF
<i>Juncus phaeocephalus</i>	brown-headed rush	JUPH	NP
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	POMO	NNF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN	NNF
<i>Zeltnera davyi</i>	Davy's centaury	ZEDA	NF

* HMP species

9.7.4.4 Vegetative Cover

Burleson completed one 50-meter line-intercept transect at HA 27A South. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 8.50%. Table 9-60 summarizes vegetative cover and Table 9-61 presents vegetative cover by species. Figure 9-42 presents the percent cover of dominant species at HA 27A South in 2016, 2017, 2018, and 2020.

Table 9-60. Transect Survey Summary for HA 27A South

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA27AT01	10.66	8.50	2.16	72.18	25.72
SITE AVERAGE	10.66	8.50	2.16	72.18	25.72

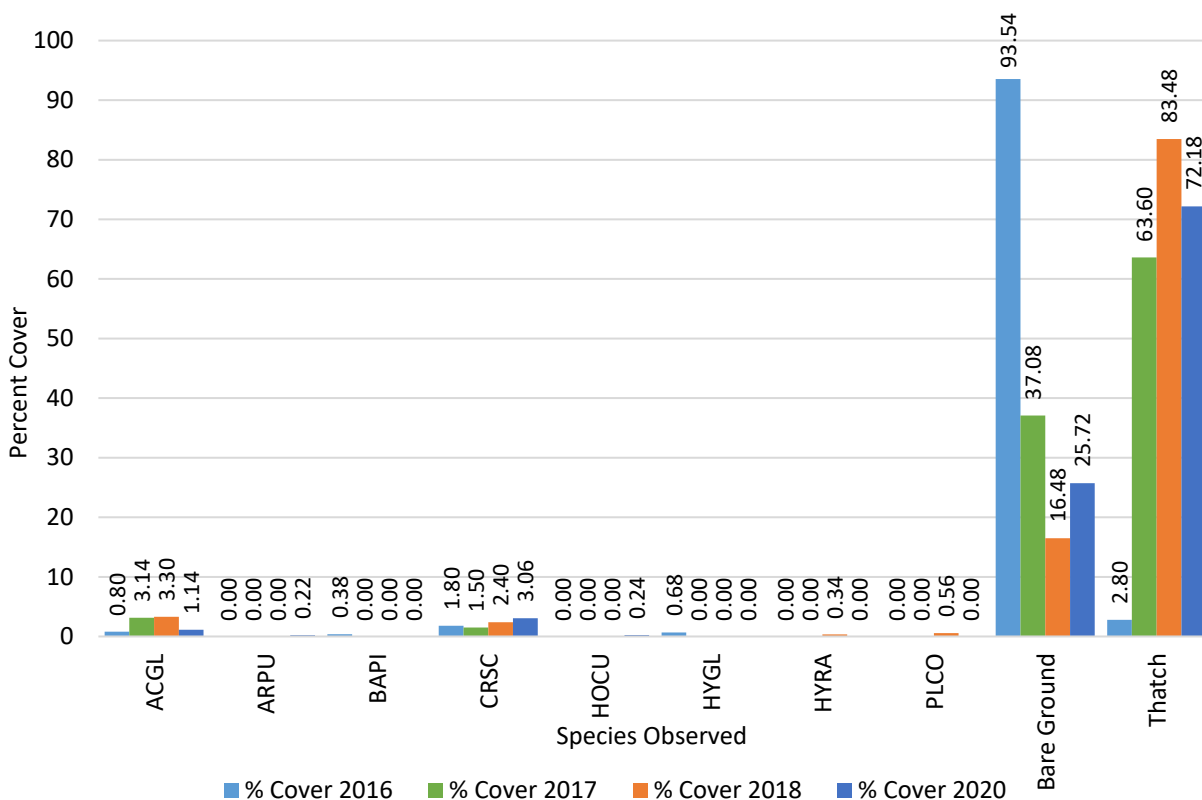
Table 9-61. Transect Survey Results for HA 27A South by Species

Transect	ACGL (%)	ARPU* (%)	CRSC (%)	FEMY (%)	HEGR (%)
HA27AT01	1.14	0.22	3.06	1.04	2.02
SITE AVERAGE	1.14	0.22	3.06	1.04	2.02

Table 9-61 (continued). Transect Survey Results for HA 27A South by Species

Transect	HOCU (%)	JUBUC2 (%)	POMO (%)	TH (%)	BG (%)
HA27AT01	0.24	1.82	1.12	72.18	25.72
SITE AVERAGE	0.24	1.82	1.12	72.18	25.72

* HMP species

**Figure 9-42. Percent Cover of Dominant Species at HA 27A South in 2016, 2017, 2018, and 2020.**

9.7.5 HA 27A South Discussion

9.7.5.1 Recommendations

HA 27A South was in year 8 of monitoring in 2020. The site met both success criteria by 2020. Per recommendations in the 2017 Annual Habitat Restoration Report, the Army has 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 is planting deerweed, coyote brush, and purple needlegrass in the 2020/2021 season to support these goals. The updated success criteria are reflected in Table 9-62 and Sections 9.7.5.2 through 9.7.5.5. A qualitative overview was documented by photo points (see Appendix D, page D-8 and Appendix F, page F-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 9-51). Table 9-62 summarizes the current status of HA 27A including which success criteria were met and recommendations.

Table 9-62. Status and Recommendations for Achieving Success Criteria at HA 27A South

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	NA	NA
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	NA	NA
Objective 3 – No. 4	HMP shrub cover by species	NA	NA
Objective 3 – No. 4	HMP annual density	NA	NA

9.7.5.2 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 27A. Therefore, no HMP annuals need to be present at this restoration site.

9.7.5.3 Plant Survivorship

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

9.7.5.4 Species Richness

At HA 27A South, coyote brush, peak rush-rose, wedge-leaved horkelia, deerweed, and sticky monkeyflower were present. HA 27A included 21 native shrub and perennial species and met the success criterion for Objective 1.

9.7.5.5 Vegetative Cover

Due to the revised success criteria, HA 27A South does not need to meet a specified percent cover for native species. However, the data were collected via line-intercept transect survey providing vegetative cover data (see Figure 9-43).

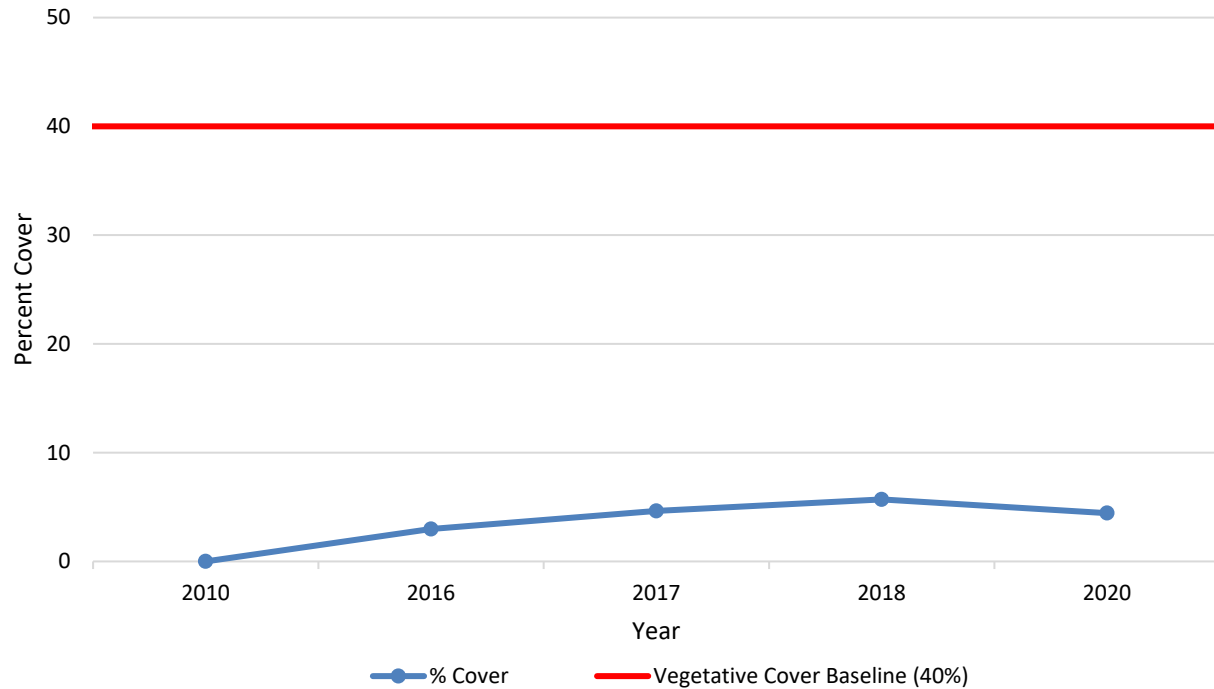


Figure 9-43. Native Vegetative Cover Compared to the Success Criterion at HA 27A South

Objective 2 considers the percent cover of non-native target weeds for HA 27A South. No target weeds were encountered during the transect surveys, resulting in 0.00% vegetative cover. This success criterion was met.

Due to the revised success criteria, Objective 3 does not apply to HA 27A South. However, the data were collected via line-intercept transect survey providing HMP shrub cover and HMP shrub cover by species data. The HMP shrub species at HA 27A South provided an absolute cover of 0.22%. The average vegetative cover for sandmat manzanita was 0.22%, Monterey manzanita was 0.00%, and Monterey ceanothus was 0.00% (see Figure 9-44).

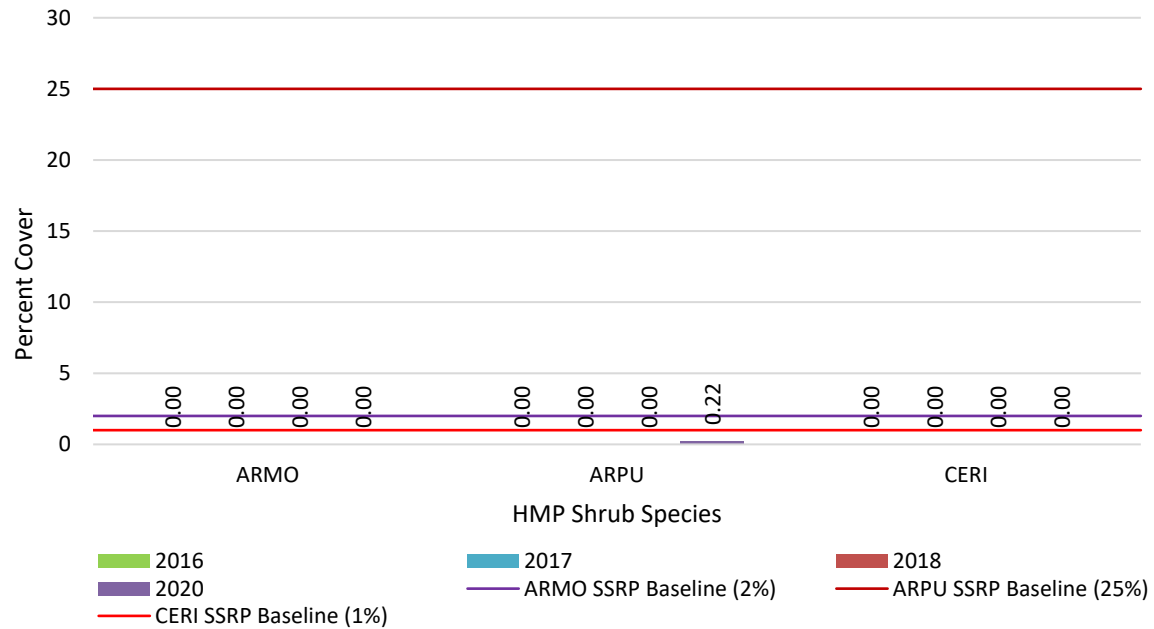


Figure 9-44. HMP Shrub Species Comparison to Success Criteria at HA 27A South

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*; CTS) 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 restoration procedure 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 began in 2013 and are ongoing. Monitoring began in 2015. The HA was monitored for eight years by photo documentation and site visits, five years for HMP annual density in plots, six years for plant survivorship, and four years for HMP annual density across the HA, species richness, and vegetative cover (see Table 9-63). Figure 9-45 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. Success criteria for HA 28 are summarized in Table 9-64.

Table 9-63. Historic Summary of Restoration and Monitoring Activities at HA 28

Activity	Monitoring Years									
			1	2	3	4	5	6	8	13
	2013	2014	2015	2016	2017	2018	2019	2020	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			●	●	●	●	●	●†		

* Photo points and site visits occur every year regardless of the monitoring year

† Plant survivorship surveys will continue in 2021

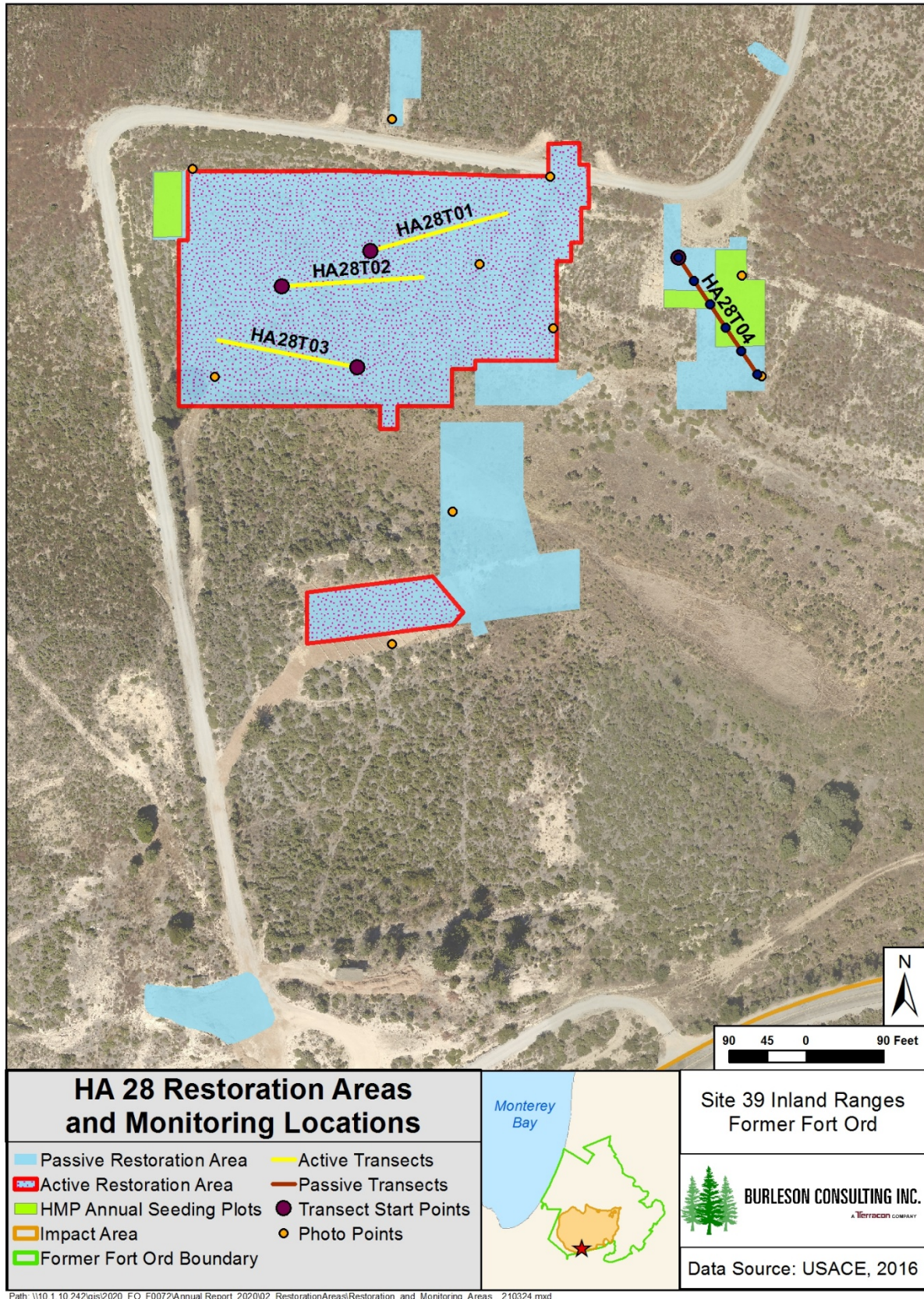


Figure 9-45. HA 28 Restoration Areas and Monitoring Locations Map

Table 9-64. 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
		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 9-65 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.

Table 9-65. 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 9-66 summarizes the plants installed during active restoration.

Table 9-66. 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

HA 28 was in year 6 of monitoring in 2020. Year 6 was not a required monitoring year and only photo documentation and plant survivorship surveys were completed.

9.8.2.1 Plant Survivorship

Plant survivorship monitoring was conducted at HA 28 for plants installed in 2015, 2018, and 2019. A total of ten shrub species and 467 individual plants were monitored. By year 3 of monitoring, survivorship was 79% for the 2015 planting. By year 3 of monitoring for the 2018 planting, survivorship was 81%; survivorship decreased from 87% in 2018. By year 2 of monitoring for the 2019 planting, survivorship was 81%. Tables 9-67 through 9-69 present results by species.

Table 9-67. Plant Survivorship Monitoring Summary for 2015 Planting at HA 28

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2015)	Year Two (2016)	Year Three (2017)
			Alive (%)	Alive (%)	Alive (%)
ADFA	473	47	100	96	96
ARHO*	237	22	95	91	92
ARMO*	237	24	83	83	83
ARTO	592	60	87	85	83
BAPI	237	24	83	50	33
CERI*	375	24	71	58	50
ERFA*	161	16	94	81	69
SAME	237	23	100	100	100
TOTAL	2,549	240	90	83	79

* HMP Species

Table 9-68. Plant Survivorship Monitoring Summary for 2018 Plantings at HA 28

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2018)	Year Two (2019)	Year Three (2020)
			Alive (%)	Alive (%)	Alive (%)
ARPU*	948	126	91	87	81
TOTAL	948	126	91	87	81

* HMP Species

Table 9-69. Plant Survivorship Monitoring Summary for 2019 Planting at HA 28

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2019)	Year Two (2020)
			Alive (%)	Alive (%)
ADFA	60	10	80	70
ARCA	75	10	100	100
ARHO*	45	10	100	100
ARMO*	71	10	80	80
ARPU	44	10	100	89
BAPI	105	11	91	82
CERI*	30	10	80	80
ERFA*	40	10	90	90
FRCA	40	10	60	20
SAME	30	10	100	100
TOTAL	540	101	88	81

* HMP Species

9.8.3 Discussion

9.8.3.1 Recommendations

HA 28 was in year 6 of monitoring in 2020; the only monitoring that occurred was photo documentation. Recommendations were developed from previous monitored results and on the ground qualitative field evaluation. The site met four of six success criteria by 2019. The SSRP prescription for active restoration was fulfilled in the 2018/2019 season. The Army is considering adding an additional monitoring transect to get data representative of the site's condition. Overall, HA 28 needs time to respond to the restoration effort and continued monitoring to evaluate areas that require additional effort. A qualitative overview was documented by photo points (see Appendix D, page D-9).

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 8, 2022 (see Table 9-63). Table 9-70 summarizes the current status of HA 28 including which success criteria were met and recommendations.

Table 9-70. Status and Recommendations for Achieving Success Criteria at HA 28

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Install additional transect in central mulched area†
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	No	Install additional transect in central mulched area†
Objective 3 – No. 4	HMP annual density	Yes	None

† Not scheduled

9.8.3.2 Plant Survivorship

Plant survivorship was moderate for the 2015 planting and high for the 2018 and 2019 plantings at HA 28. Coyote brush had low survivorship in the 2015 planting event, whereas all other species had moderate to high survivorship. Sandmat manzanita was the only species installed in the 2018 planting and had high survivorship. In the 2019 planting event California coffeeberry (*Frangula californica*) had low survivorship, chamise had moderate survivorship, and other species had high survivorship. Survivorship for the 2019 planting event will be monitored for one more year.

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 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 restoration procedure 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 began in 2011 and was completed in 2013. Monitoring began in 2013 and additional seed was broadcast in 2016, 2018, 2019, and 2020. The HA was monitored for ten years by photo documentation and site visits, three years for plant survivorship, and four years for species richness and vegetative cover (see Table 9-71). Figure 9-46 shows the HA footprint, passive restoration area, active restoration area, and transect monitoring locations. Success criteria for HA 29 are summarized in Table 9-72.

Table 9-71. Historic Summary of Restoration and Monitoring Activities at HA 29

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

* Photo points and site visits occurred every year regardless of the monitoring year

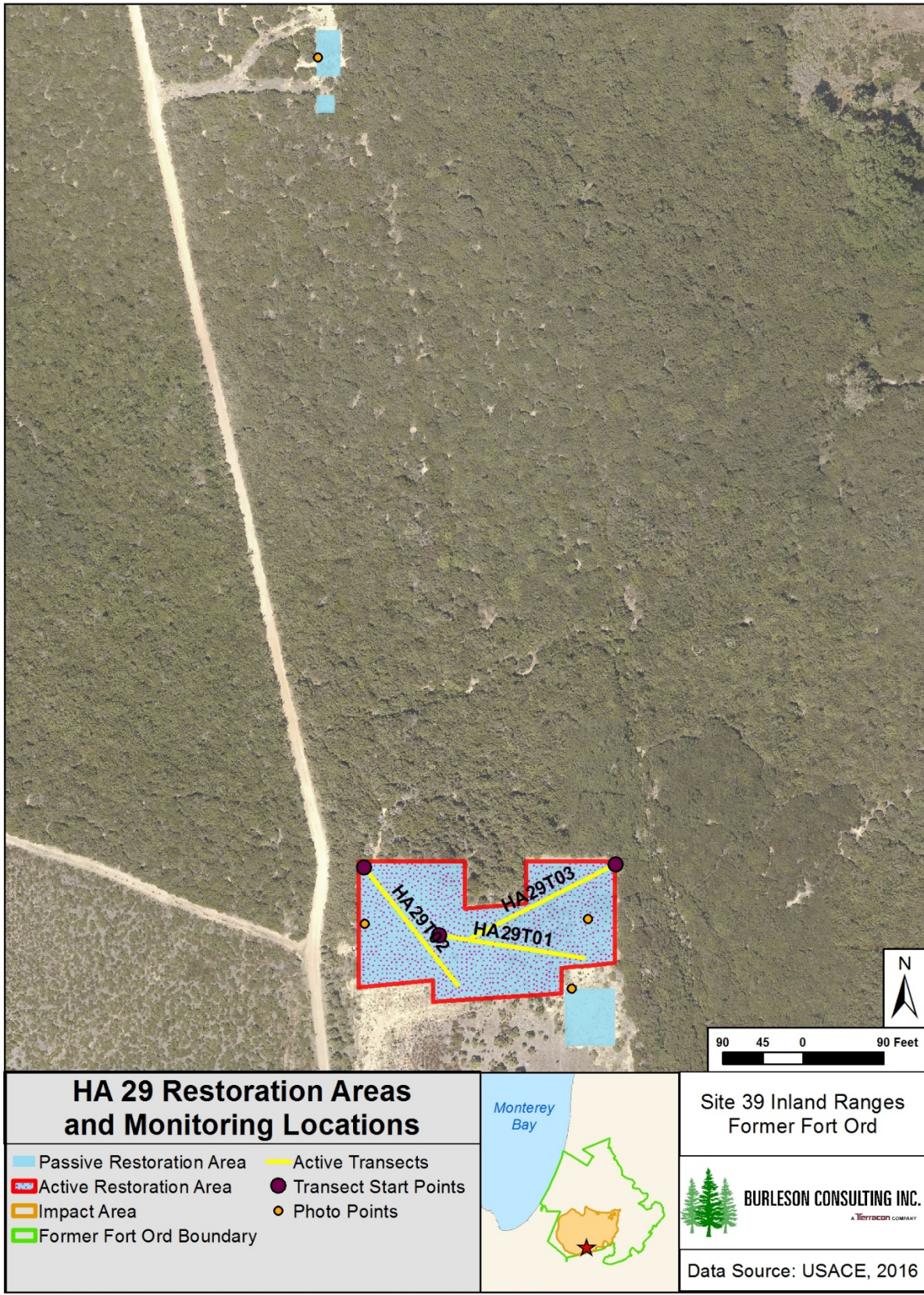


Figure 9-46. HA 29 Restoration Areas and Monitoring Locations Map

Table 9-72. 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
		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 9-72. 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, and 2020. The total amount of seed broadcast on site was 50.49 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 9-73 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-73. Summary of Passive Restoration Activities for HA 29

Species	Pounds of Seed Broadcast							
	SSRP Target	2012 (Feb)	2012 (Dec)	2016	2018	2019	2020	Total by Species
ACMI	-	-	-	0.800	0.800	0.600	4.000	6.200
ACGL	2.000	1.000	1.025	1.600	-	-	4.000	7.625
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	-	5.200
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	-	4.000
TOTAL	24.650	7.658	17.832	6.600	6.400	4.000	8.000	50.490

* HMP species

Active restoration was conducted in 2012, 2013, and 2019 at HA 29; SSRP planting was completed in 2013. An AMP planting event occurred in 2019 per recommendations made in the 2018 Annual Report (Burleson, 2019a). The total number of plants installed at HA 29 was 1,671 compared to 1,374 prescribed in the SSRP. Table 9-74 summarizes the plants installed during active restoration.

Table 9-74. Summary of Active Restoration Activities for HA 29

Species	Number of Individual Plants				
	SSRP Target	2012	2013	2019	Total by Species
ACGL	189	225	-	-	225
ADFA	101	-	120	-	120
ARHO*	4	-	5	-	5
ARMO*	13	-	15	-	15
ARPU*	17	-	20	-	20
ARTO	21	-	25	-	25
BAPI	76	91	-	-	91
CERI*	4	-	5	-	5
CRSC	189	225	-	-	225
DIAU	189	225	-	-	225
ERCO	189	225	-	-	225
ERFA*	4	-	25	-	25
HEAR	-	-	-	15	15
HOCU	189	225	-	-	225
SAME	189	225	-	-	225
TOTAL	1,374	1,441	215	15	1,671

* HMP species

9.9.2 Monitoring Results

9.9.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 29. Therefore, no HMP annuals need to be present at this restoration site.

9.9.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 29. A total of nine shrub species and 160 individual plants were monitored for survivorship. By year 3 of monitoring, survivorship was 89% for the 2013 planting. Survivorship monitoring is complete. See Table 9-75 for results by species.

Table 9-75. Plant Survivorship Monitoring Summary for 2013 Planting at HA 29

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2013)	Year Two (2014)	Year Three (2015)
			Alive (%)	Alive (%)	Alive (%)
ADFA	120	45	96	95	91
ARHO*	5	5	100	100	100
ARMO*	15	15	93	93	87
ARPU*	20	20	95	95	90
ARTO	25	25	92	88	88
BAPI	91	20	95	100	75
CERI*	5	5	100	80	80
ERFA*	5	5	100	100	100
SAME	225	20	100	100	95
TOTAL	511	160	96	95	89

* HMP Species

9.9.2.3 Species Richness

Fifty-nine species were observed at HA 29. Of those, 36 were native shrubs or perennials, eight were native annual herbaceous species, and 15 were non-native species (see Table 9-76). Species richness increased by nine species since 2018. Native shrub and perennial species increased by four, native herbaceous species increased by three, and non-native species increased by two.

Table 9-76. Species Observed on HA 29, 2020

Scientific Name	Common Name	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon heermannii</i> var. <i>orbicularis</i>	Heermann's lotus	ACHEO	NP
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophylla</i>	silver hair grass	AICA	NNF
<i>Arbutus menziesii</i>	Pacific madrone	ARME	NP
<i>Arctostaphylos hookeri</i> *	Hooker's manzanita	ARHO	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Artemisia californica</i>	California sagebrush	ARCA	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Briza minor</i>	small quaking grass	BRMI	NNF
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Carex</i> sp.	sedge	CA	NP
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Deinandra corymbosa</i>	coastal tarweed	DECO	NF
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP

Table 9-76. Species Observed on HA 29, 2020

Scientific Name	Common Name	Code	Category
<i>Drymocallis glandulosa</i> var. <i>wrangelliana</i>	sticky cinquefoil	DRGLW	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Heteromeles arbutifolia</i>	toyon	HEAR	NP
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Lepechinia calycina</i>	pitcher sage	LECA	NP
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Madia exigua</i>	little tarweed	MAEX	NF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Piperia</i> sp.	rein orchid	PI	NP
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	POMO	NNF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Salix laevigata</i>	red willow	SALA3	NP
<i>Salix lasiolepis</i>	arroyo willow	SALA6	NP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Silene gallica</i>	small-flower catchfly	SIGA	NNF
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN	NNF
<i>Verbena lasiostachys</i> var. <i>lasiostachys</i>	western vervain	VELAL	NP
<i>Zeltnera davyi</i>	Davy's centaury	ZEDA	NF

* HMP species

9.9.2.4 Vegetative Cover

Burleson completed three 50-meter line-intercept transects at HA 29. Two additional transects were installed prior to 2018 monitoring. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 36.93%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than in 2018 by 9.9%. Table 9-77 summarizes vegetative cover and Table 9-78 presents vegetative cover by species. Figure 9-47 presents the percent cover of dominant species at HA 28 in 2016, 2017, 2018, and 2020.

Table 9-77. Transect Survey Summary for HA 29

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA29T01	36.06	35.48	0.58	58.68	38.88
HA29T02	14.08	14.08	0.00	84.20	15.58
HA29T03	61.84	61.22	0.62	70.50	27.88
SITE AVERAGE	37.33	36.93	0.40	71.13	27.45

Table 9-78. Transect Survey Results for HA 29 by Species

Transect	ACGL (%)	ADFA (%)	AICA (%)	ARMO* (%)	ARPU* (%)	ARTO (%)	BAPI (%)	CEDE (%)	CERI* (%)
HA29T01	8.02	1.74	0.58	0.00	8.44	0.00	7.28	5.24	0.00
HA29T02	6.48	0.90	0.00	0.00	1.08	0.00	0.00	0.00	1.68
HA29T03	1.02	1.34	0.00	2.88	10.98	17.42	0.00	14.84	0.00
SITE AVERAGE	5.17	1.33	0.19	0.96	6.83	5.81	2.43	6.69	0.56

Table 9-78 (continued). Transect Survey Results for HA 29 by Species

Transect	COJU (%)	CRSC (%)	DIAU (%)	HOCU (%)	LECA (%)	SAME (%)	TH (%)	BG (%)
HA29T01	0.00	2.20	0.28	1.58	0.00	0.70	58.68	38.88
HA29T02	0.00	1.66	0.00	1.02	0.00	1.26	84.20	15.58
HA29T03	0.62	2.32	1.02	2.90	1.10	5.40	70.50	27.88
SITE AVERAGE	0.21	2.06	0.43	1.83	0.37	2.45	71.13	27.45

* HMP species

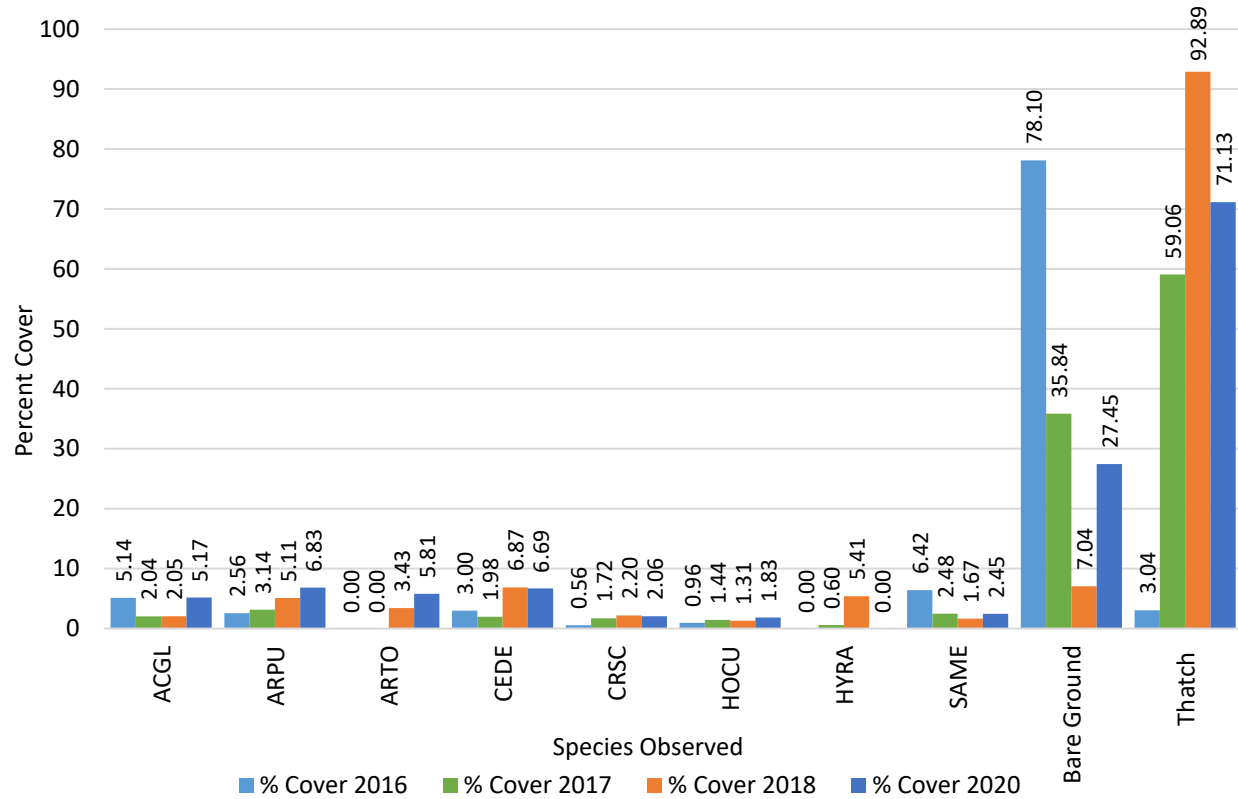


Figure 9-47. Percent Cover of Dominant Species at HA 29 in 2016, 2017, 2018, and 2020.

9.9.3 Discussion

9.9.3.1 Recommendations

HA 29 was in year 8 of monitoring in 2020. The site met two out of five success criteria by 2020. Per recommendations in the 2016 Annual Habitat Restoration Report, toyon (*Heteromeles arbutifolia*) was planted the in 2018/2019 season to support species richness and Hooker's manzanita (*Arctostaphylos hookeri*), Monterey manzanita, sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush will be planted in the 2020/2021 season to support the HMP shrub cover criteria (Burlson, 2017). Overall, HA 29 needs the scheduled corrective measures and time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-10 and Appendix F, page F-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 9-71). Table 9-79 summarizes the current status of HA 29 including which success criteria were met and recommendations.

Table 9-79. Status and Recommendations for Achieving Success Criteria at HA 29

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Plant Hooker's manzanita, Monterey manzanita, sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush* (scheduled 2020/2021)
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Plant Hooker's manzanita, Monterey manzanita, sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush* (scheduled 2020/2021)
Objective 3 – No. 4	HMP shrub cover by species	No	Plant Hooker's manzanita, Monterey manzanita, sandmat manzanita, Monterey ceanothus, and Eastwood's goldenbush* (scheduled 2020/2021)
Objective 3 – No. 4	HMP annual density	NA	NA

* Recommendation repeated from the 2016 Annual Habitat Restoration Report (Burleson, 2017).

9.9.3.2 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 29. Therefore, no HMP annuals need to be present at this restoration site.

9.9.3.3 Plant Survivorship

Plant survivorship was moderate for coyote brush and high for all other species for the 2013 planting at HA 29. Survivorship monitoring is complete.

9.9.3.4 Species 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, and black sage were present. HA 29 included 36 native shrub and perennial species and met the success criterion for Objective 1.

9.9.3.5 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 presented in Table 2 of the HA 29 SSRP (Burleson, 2013). Currently the HA includes 29.87% cover; therefore, this success criterion was not met (see Figure 9-48).

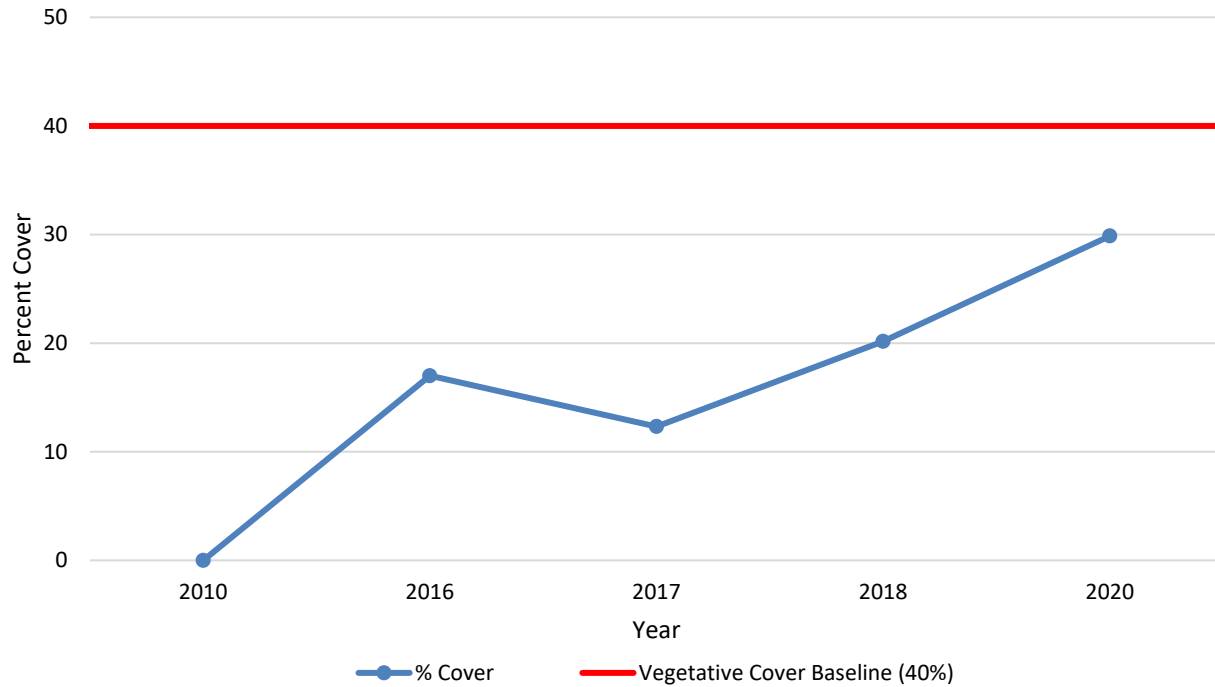


Figure 9-48. Native Vegetative Cover Compared to the Success Criterion at HA 29

Objective 2 considers the percent cover of non-native target weeds. In 2020, jubata grass was observed during the transect surveys. The vegetative cover for target non-native species was 0.21%, which is less than the 5% acceptable limit; therefore, 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 4. Cover class 4 ranges from 26-50% of absolute cover. The HMP shrub species at HA 29 provided an absolute cover of 8.35%; therefore, the HA did not meet this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 29, this means a vegetative cover average of at least 2% for Hooker's manzanita, 7% for Monterey manzanita, 27% for sandmat manzanita, 1% for Monterey ceanothus, and 2% for Eastwood's goldenbush. The average vegetative cover for Hooker's manzanita was 0.00%, Monterey manzanita was 0.96%, sandmat manzanita was 6.83%, Monterey ceanothus was 0.56%, and Eastwood's goldenbush was 0.00% (see Figure 9-49). The success criterion was not met.

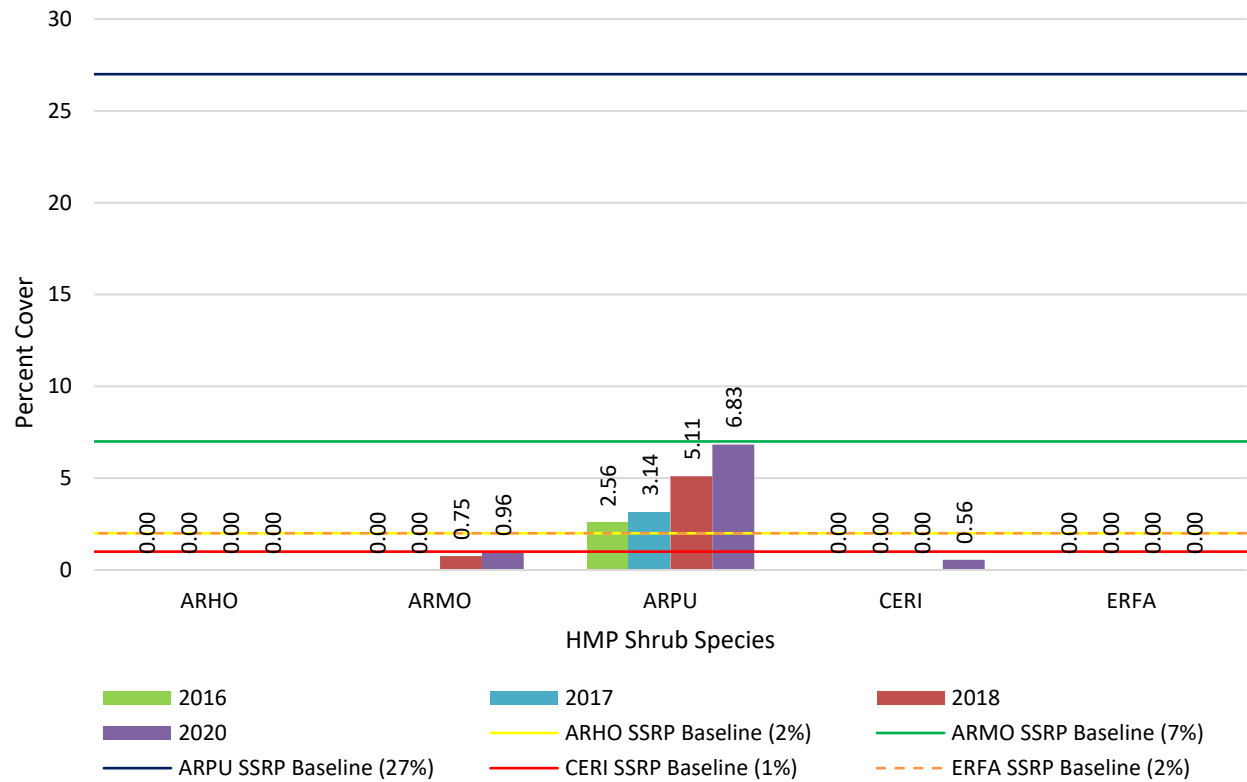


Figure 9-49. HMP Shrub Species Comparison to Success Criteria at HA 29

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 was excavated from 0.01 acre (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. Monitoring began in 2013. The HA was monitored for ten 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 9-80). Figure 9-50 shows the HA footprint, passive restoration area, and transect survey location. Success criteria for HA 33 are summarized in Table 9-81.

Table 9-80. Historic Summary of Restoration and Monitoring Activities at HA 33

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

* Photo points and site visits occur every year regardless of the monitoring year

† Vegetative cover was monitored using quadrats in 2016

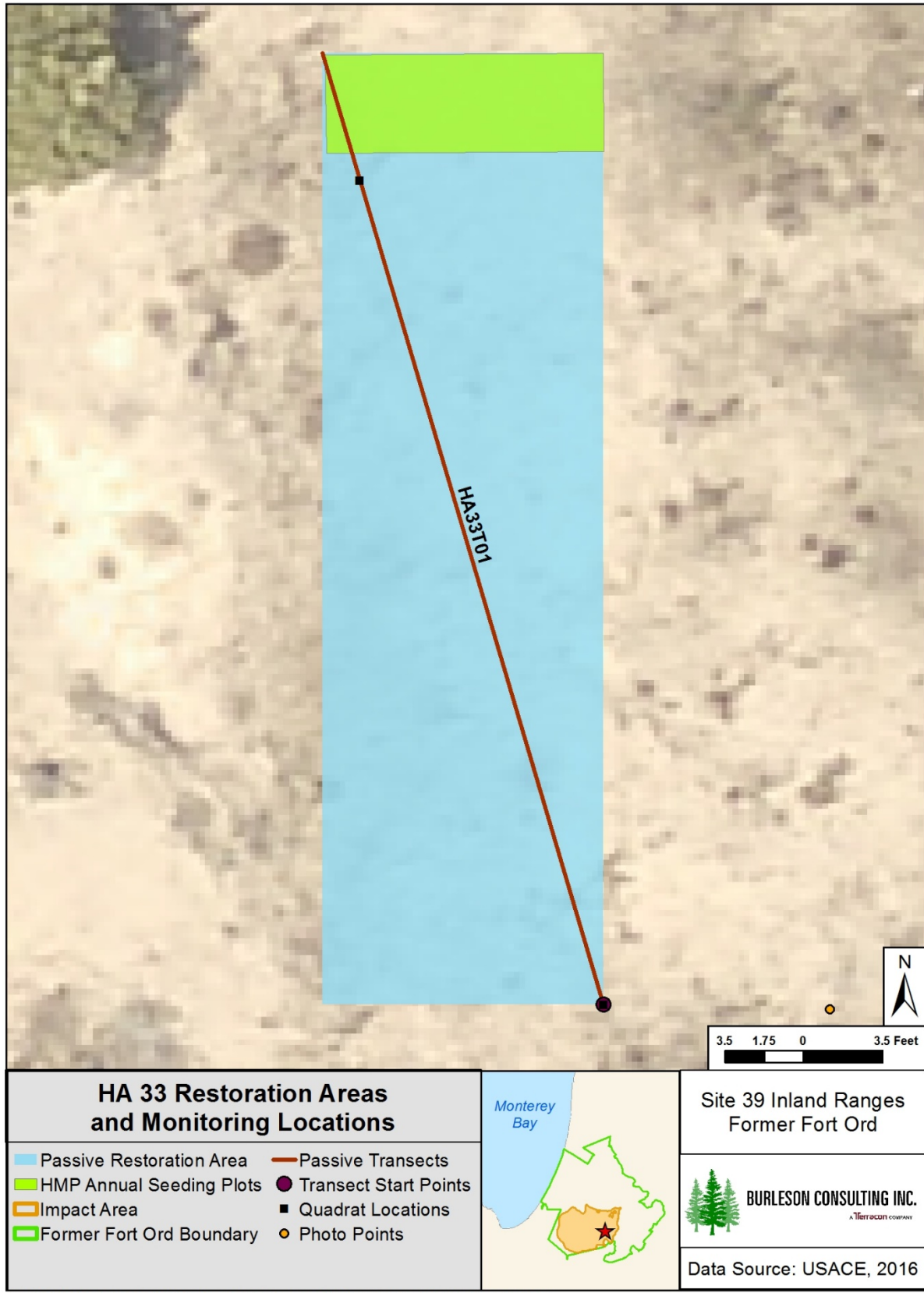


Figure 9-50. HA 33 Restoration Areas and Monitoring Locations Map

Table 9-81. 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
		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 9-82 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.

Table 9-82. Summary of Passive Restoration Activities for HA 33

Species	Pounds of Seed Broadcast					Total by Species
	SSRP Target	2011	2012	2019	2020	
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 per recommendations made in the 2016 Annual Report (Burleson, 2017). A total of 184 plants were installed at HA 33. Table 9-83 summarizes the plants installed during active restoration.

Table 9-83. 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

9.10.2.1 HMP Annual Density

One Monterey spineflower plot was surveyed for year 8 density at HA 33 in 2020. The plot is numbered 1 on Figure 9-52 and is located in the northern part of the site. Monterey spineflower density was low at Plot 1. Figure 9-51 summarizes all the Monterey spineflower restoration plot densities for HA 33.

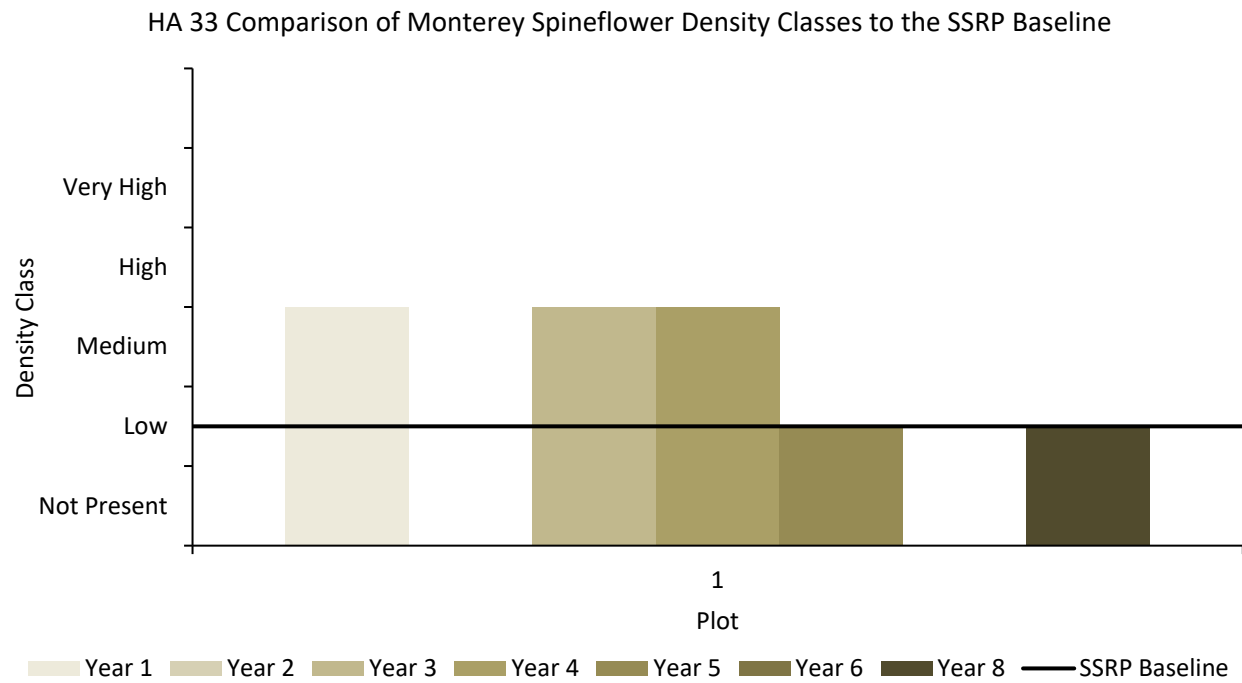


Figure 9-51. HA 33 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plot 1

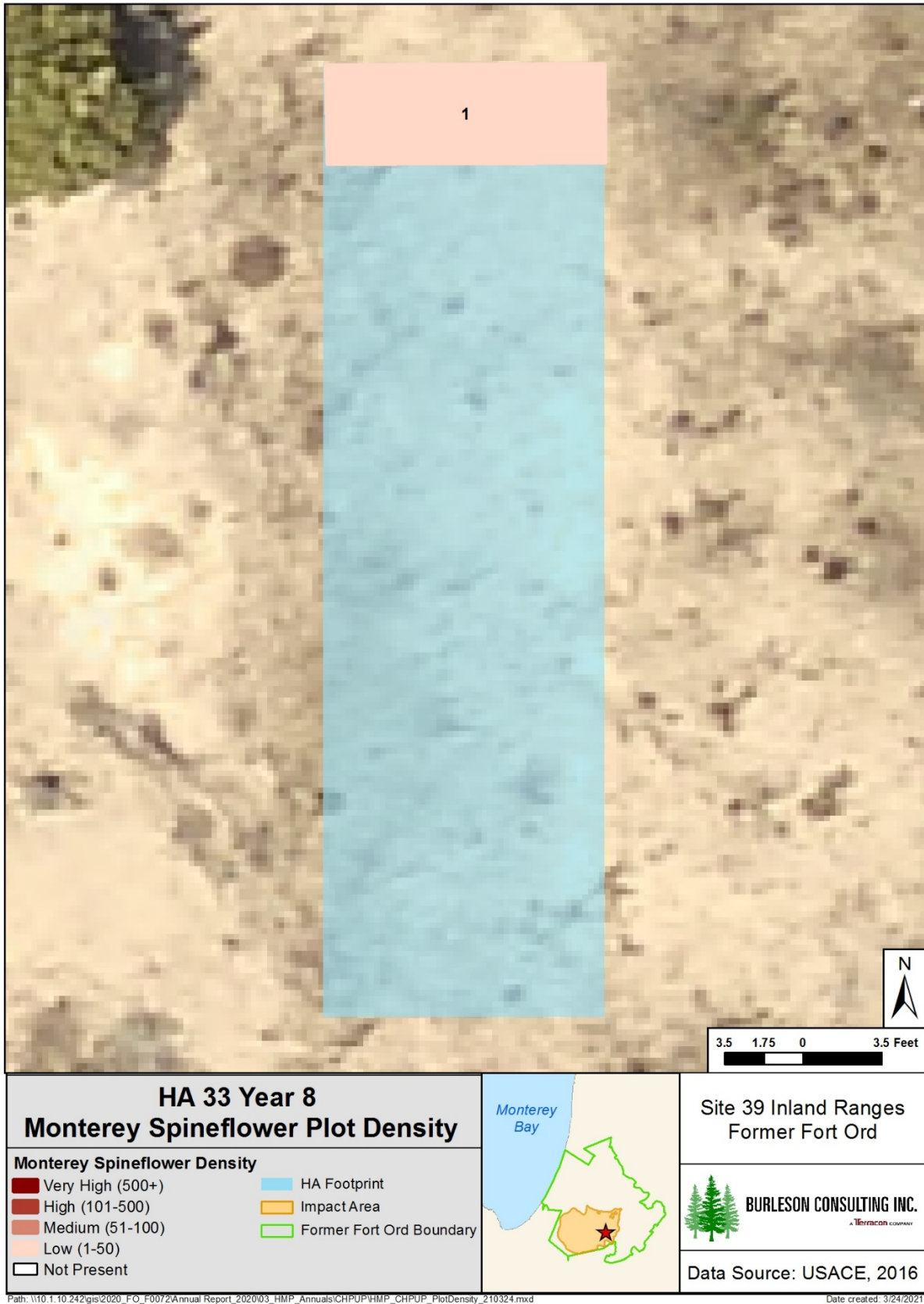


Figure 9-52. HA 33 Year 8 Monterey Spineflower Plot Density Map

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 Monterey spineflower at HA 33.

Eighteen individual plants of Monterey spineflower were counted and mapped at HA 33 (see Figure 9-53). Densities and acreages were not calculated because no discrete patches were observed. Monterey spineflower was not found outside of the restoration plot in 2018.

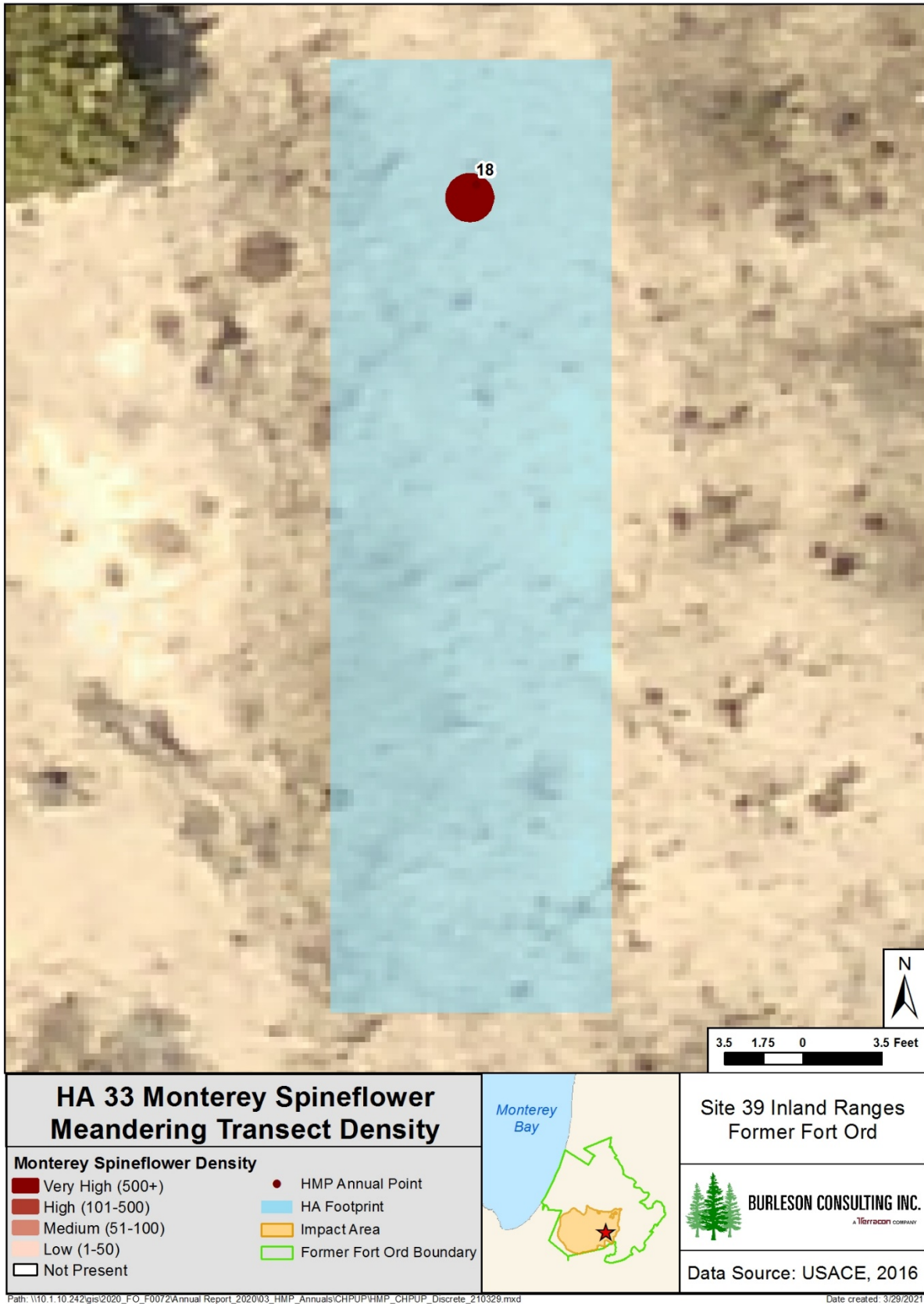


Figure 9-53. HA 33 Monterey Spineflower Meandering Transect Density Map

9.10.2.2 Plant Survivorship

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

9.10.2.3 Species Richness

Forty-two species were observed at HA 33. Of those, 26 were native shrubs or perennials, six were native annual herbaceous species, and 10 were non-native species (see Table 9-84). Species richness increased by four species since 2018. Native shrub and perennial species increased by six, native herbaceous species increased by two, and non-native species decreased by four.

Table 9-84. Species Observed on HA 33, 2020

Scientific Name	Common Names	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophylla</i>	silver hair grass	AICA	NNF
<i>Arctostaphylos hookeri</i> *	Hooker's manzanita	ARHO	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Artemisia californica</i>	California sagebrush	ARCA	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Cardionema ramosissimum</i>	sand mat	CARA	NP
<i>Carex</i> sp.	sedge	CA	NP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crassula connata</i>	pygmy-weed	CRCO	NF
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Garrya elliptica</i>	coast silk tassel	GAEL	NP
<i>Gastridium phleoides</i>	nit grass	GAPH	NNF
<i>Heteromeles arbutifolia</i>	toyon	HEAR	NP
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Hordeum</i> sp.	sterile barley	HO	NNF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Juncus bufonius</i>	toad rush	JUBU	NF
<i>Lepechinia calycina</i>	pitcher sage	LECA	NP
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Luzula comosa</i> var. <i>comosa</i>	Pacific wood rush	LUCOC	NP
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP

Table 9-84. Species Observed on HA 33, 2020

Scientific Name	Common Names	Code	Category
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Silene gallica</i>	small-flower catchfly	SIGA	NNF
<i>Stipa pulchra</i>	purple needle grass	STPU	NP

* HMP species

9.10.2.4 Vegetative Cover

One 12-meter line-intercept transect survey was completed at HA 33. The survey indicated that vegetative cover by native shrubs and perennials was 14.42%. Quadrats were completed along the transect line when 10% or more of the transect line was herbaceous cover, in accordance with the *Protocol for Conducting Vegetation Monitoring* (Burleson, 2009). The mean vegetative cover by native shrubs and perennials remained the same from 2018 to 2020. Table 9-85 summarizes vegetative cover and Table 9-86 presents vegetative cover by species. Figure 9-54 presents the percent cover of dominant species at HA 33 in 2017, 2018, and 2020 and Table 9-87 presents quadrat results.

Table 9-85. Transect Survey Summary for HA 33

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA33T01	33.67	14.42	19.25	98.50	1.50
SITE AVERAGE	33.67	14.42	19.25	98.50	1.50

Table 9-86. Transect Survey Results for HA 33 by Species

Transect	AICA (%)	ARTO (%)	CRSC (%)	HOCU (%)	STPU (%)	TH (%)	BG (%)
HA33T01	19.25	0.83	11.17	1.08	1.33	98.50	1.50
SITE AVERAGE	19.25	0.83	11.17	1.08	1.33	98.50	1.50

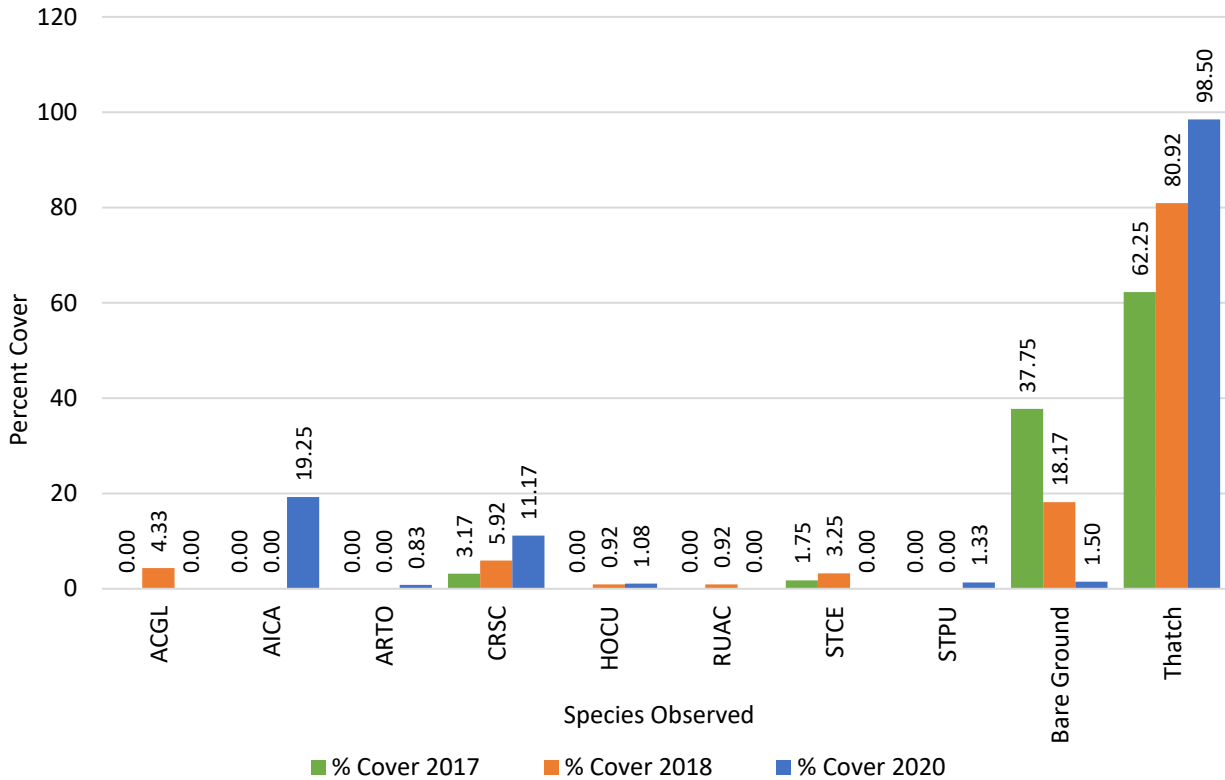


Figure 9-54. Percent Cover of Dominant Species at HA 33 in 2017, 2018, and 2020.

Table 9-87. Quadrat Summary for HA 33 Transect T01

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA33T01Q01	64	62	1	1	26	10
HA33T01Q02	57	31	2	24	33	10
SITE AVERAGE	61	47	2	13	30	10

9.10.3 Discussion

9.10.3.1 Recommendations

HA 33 was in year 8 of monitoring in 2020. The site met three out of six success criteria by 2020. Per recommendations in the 2016 Annual Habitat Restoration 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 and Monterey manzanita and Monterey ceanothus were planted in the 2019/2020 season to support the HMP shrub cover success criterion (Burleson, 2017). Overall, HA 33 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-11 and Appendix F, page F-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 9-80). Table 9-88

summarizes the current status of HA 33 including which success criteria were met and recommendations.

Table 9-88. Status and Recommendations for Achieving Success Criteria at HA 33

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP shrub cover by species	No	Wait to see how the HA responds
Objective 3 – No. 4	HMP annual density	Yes	None

9.10.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 33. The SSRP baseline density class for Monterey spineflower was low. Year 8 Monterey spineflower restoration plot results show that the density exceeded the success criterion under Objective 3. In addition, Monterey spineflower was present outside the restoration plot. The density was not calculated because only individuals were observed. This concludes HMP annual monitoring for Monterey spineflower at HA 33, the success criterion has been met.

9.10.3.3 Plant Survivorship

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

9.10.3.4 Species 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, and black sage were present. HA 33 included 26 native shrub and perennial species and met the success criterion for Objective 1.

9.10.3.5 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 16 shrub and perennial species presented in Table 2 of the HA 33 SSRP (Burleson, 2013). These species contributed 12.25% cover to the HA; therefore, this success criterion was not met (see Figure 9-55). In 2016, a quadrat survey was completed to provide a preliminary idea of vegetative cover with a limited amount of effort. From 2017 onward, line-intercept transect surveys were used, as multiple objectives outlined in the SSRP specifically require transect data. The 2016 quadrat data were not compared to the success criteria.

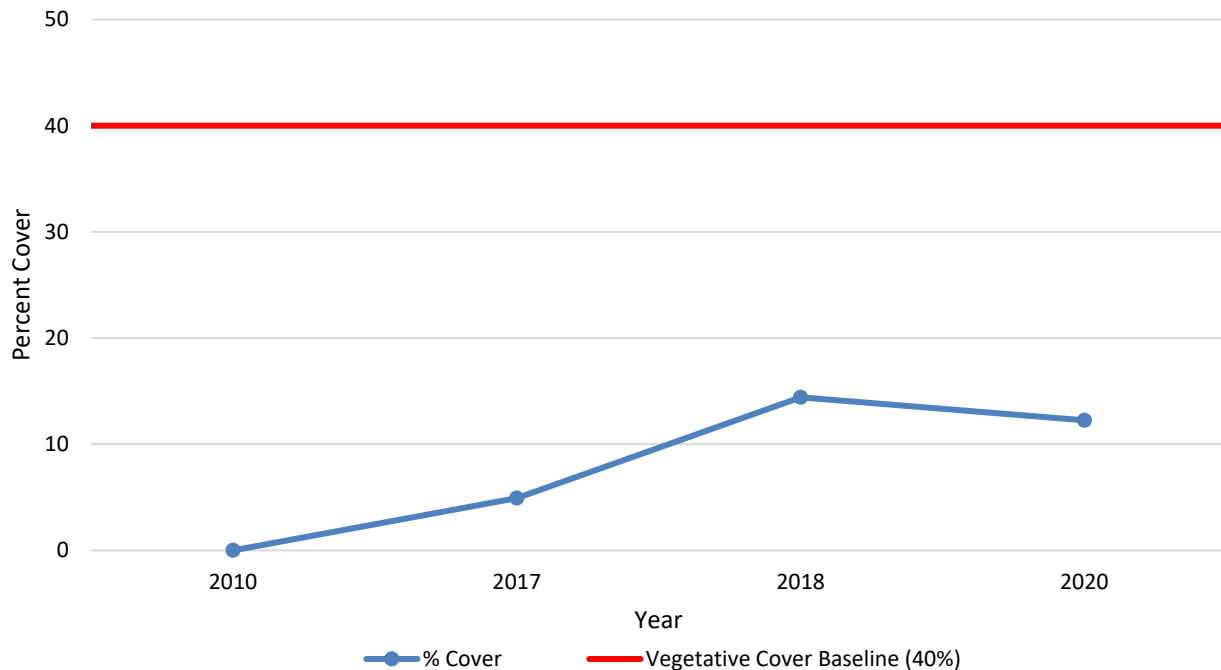


Figure 9-55. Native Vegetative Cover Compared to the Success Criterion at HA 33

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 4. Cover class 4 ranges from 26-50% of absolute cover. The HMP shrub species at HA 33 provided an absolute cover of 0.00%; therefore, the HA did not meet this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 33, this means a vegetative cover average of at least 30% for Monterey manzanita and 5% for Monterey ceanothus. The average vegetative cover for Monterey manzanita was 0.00% and Monterey ceanothus 0.00% (see Figure 9-56). Neither species met the acceptable limit; therefore, the success criterion was not met.

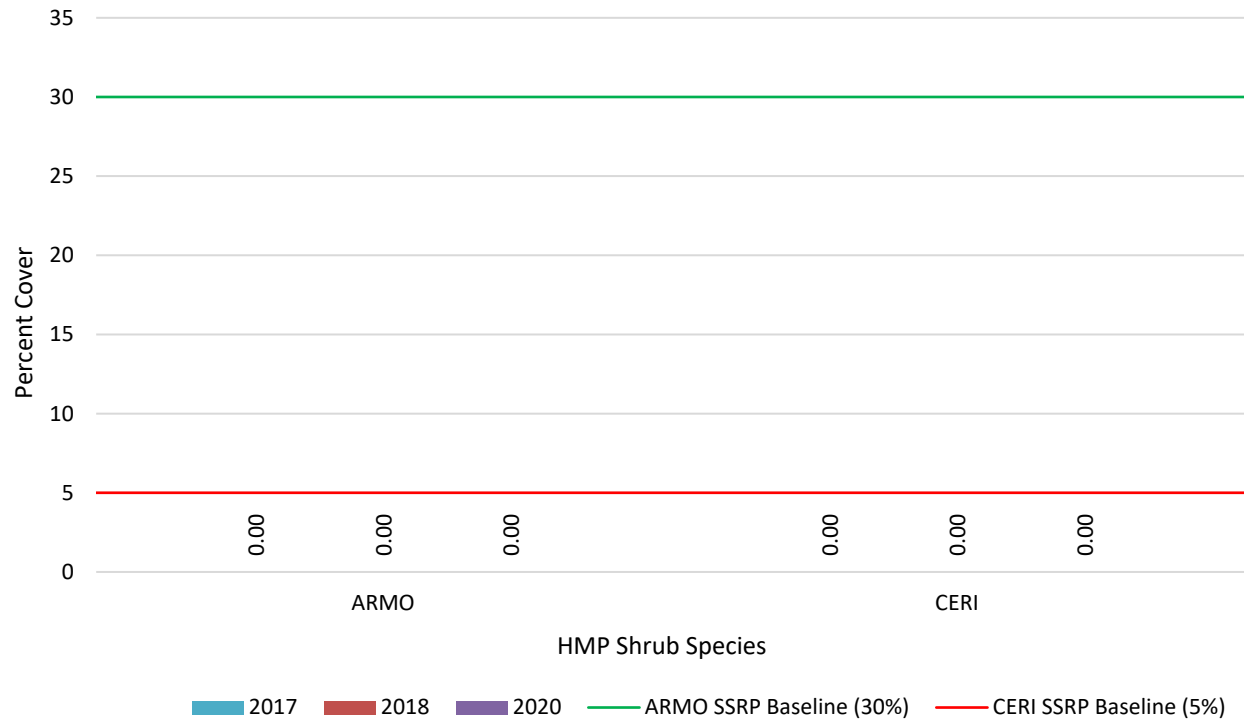


Figure 9-56. HMP Shrub Species Comparison to Success Criteria at HA 33

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 was 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 restoration procedure 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 was revised due to the marginal response to restoration efforts. Under the revised success criteria: the HMP shrub cover class was reduced from three to two and the HMP shrub cover by species was reduced for Monterey manzanita, Monterey ceanothus, and Hooker's manzanita from 31 percent, 7 percent, and 4 percent respectively, to equal or greater than 1 percent for each species (USFWS, 2020).

Restoration at HA 34 began in 2012 and is ongoing. Monitoring began in 2015. HA 34 was monitored for nine years by photo documentation and site visits, five years for plant survivorship, and four years for species richness and vegetative cover (see Table 9-89). Figure 9-57 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 34 are summarized in Table 9-90.

Table 9-89. Historic Summary of Restoration and Monitoring Activities at HA 34

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

* Photo points and site visits occur every year regardless of the monitoring year

† Plant survivorship surveys will continue in 2021

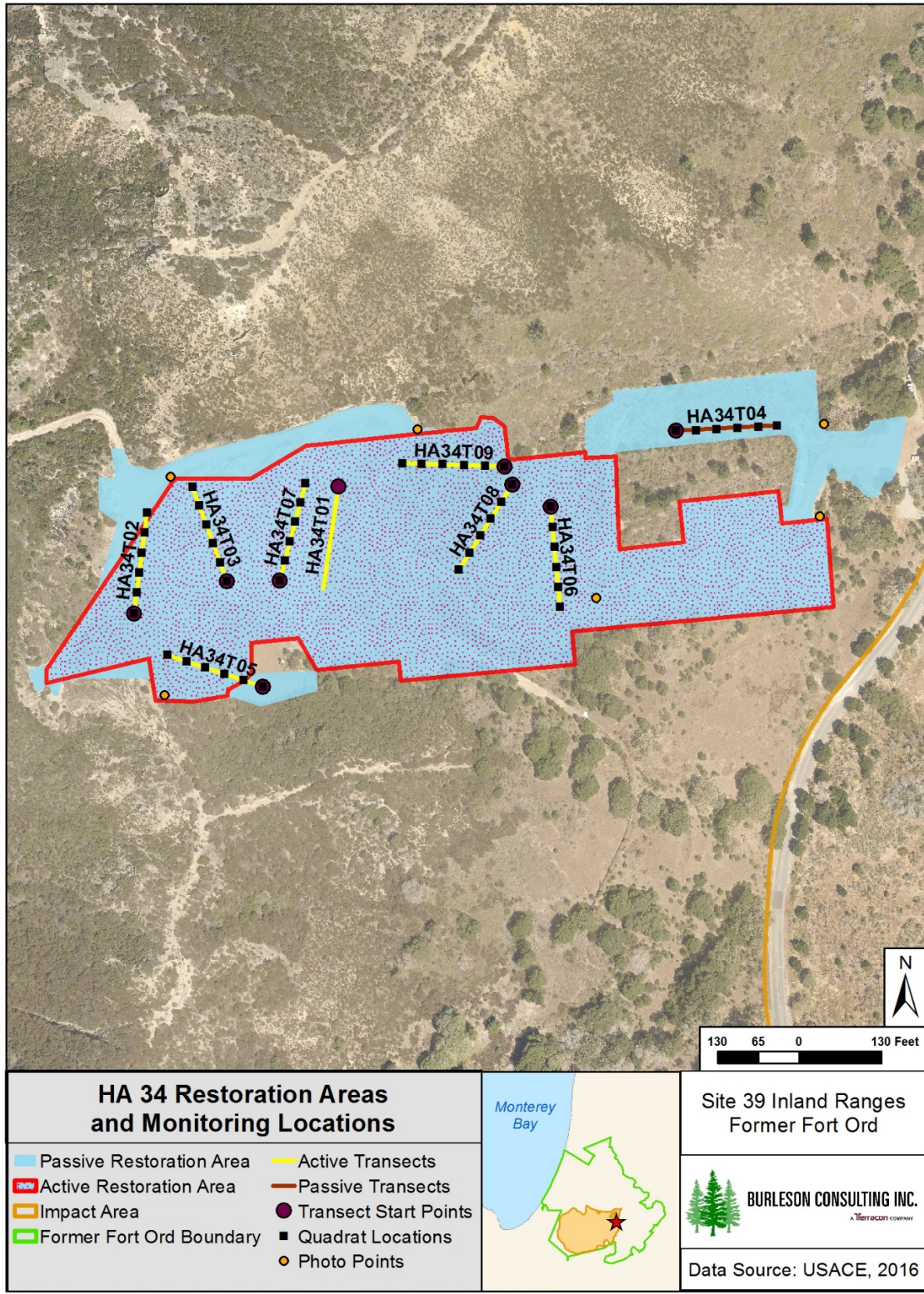


Figure 9-57. HA 34 Restoration Areas and Monitoring Locations Map

Table 9-90. 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‡
		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

‡ Success criteria updated by USFW (USFWS, 2020)

9.11.1 Restoration Activities

Burleson performed passive restoration at HA 34 in 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, and 2020. The total amount of seed broadcast on site was 1,230.18 lb compared to the 320.41 lb prescribed in the SSRP. Total seed broadcast exceeded the SSRP prescription because additional seed was broadcast for erosion control activities. Table 9-91 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-91. Summary of Passive Restoration Activities for HA 34

Species	Pounds of Seed Broadcast										
	SSRP Target	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total by Species
ACMI	15.41	9.51	-	1.69	1.00	5.72	0.50	2.00	2.85	10.00	33.27
ACGL	19.40	18.29	-	3.37	2.00	11.40	1.00	0.20	-	13.50	49.76
ADFA	-	9.50	-	-	-	-	-	-	-	-	9.50
ARCA	15.50	9.50	4.60	-	1.00	-	-	-	-	1.25	16.35
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	3.45
CERI*	15.50	9.50	3.30	-	1.00	-	-	-	-	1.25	15.05
CRSC	15.50	9.15	-	1.26	1.00	-	-	-	-	1.25	12.66
DIAU	1.50	0.95	-	0.25	0.10	-	-	-	-	0.13	1.43
ELGL	87.30	85.50	46.00	80.34	9.00	14.88	27.05	6.40	8.40	33.00	310.57
ERCO	2.90	2.85	-	2.11	0.30	-	-	-	-	0.38	5.64
HO	87.30	150.00	245.00	33.70	9.00	2.32	101.20	17.40	1.20	15.50	575.32
HOCU	19.40	18.29	4.60	46.97	2.00	11.40	1.00	2.80	3.80	-	90.86
LUAR	9.70	9.50	-	-	1.00	-	-	-	-	1.25	11.75
SAME	9.70	9.51	0.60	3.37	1.00	-	-	-	-	1.25	15.73
STPU	19.40	19.00	-	-	2.00	6.99	1.25	4.00	5.25	2.35	40.84
TOTAL	320.41	400.45	305.45	173.31	30.60	52.71	132.00	32.80	21.50	81.36	1,230.18

* HMP species

Active restoration was conducted in 2016, 2017, and 2019. The total number of plants installed at HA 34 was 10,876 compared to 12,150 prescribed in the SSRP. Table 9-92 summarizes the plants installed during active restoration.

Table 9-92. 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)	Total by Species
ACMI	500	54	154	110	318
ACGL	1,500	350	570	441	1,361
ADFA	500	158	372	223	753
ARCA	500	135	208	210	553
ARHO*	500	76	286	272	634
ARMO*	500	76	277	148	501
ARTO	500	76	118	199	393
BAPI	500	95	270	248	613
CERI*	500	132	556	266	954
CRSC	1,500	228	534	391	1,153
DIAU	1,500	246	406	348	1,000
ERCO	800	-	320	295	615
FRCA	-	-	-	10	10
GAEL	-	-	-	9	9
HOCU	1,500	17	91	553	661
LECA	-	-	-	25	25
LUAL	-	-	108	-	108
LUAR	500	95	236	185	516
SAME	850	45	330	324	699
TOTAL	12,150	1,783	4,836	4,257	10,876

* HMP Species

9.11.2 Monitoring Results

HA 34 was in year 6 of monitoring in 2020. Year 6 was not a required monitoring year however plant survivorship surveys and photo documentation were completed.

9.11.2.1 Plant Survivorship

Plant survivorship monitoring was conducted at HA 34 for plants installed in 2016, 2017, and 2019. A total of 13 shrub species and 597 individual plants were monitored for survivorship. By year 3 of monitoring, survivorship was 60% for the 2016 planting and 23% for the 2017 planting. By year 2 of monitoring for the 2019 planting, survivorship was 19%. Tables 9-93 through 9-95 present results by species.

Table 9-93. 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 9-94. 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 9-95. Plant Survivorship Monitoring Summary for 2019 Plantings at HA 34

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2019)	Year Two (2020)
			Alive (%)	Alive (%)
ADFA	223	21	48	19
ARCA	210	21	57	14
ARHO*	272	18	56	28
ARMO*	148	15	33	20
ARTO	199	20	40	5
BAPI	248	24	75	52
CERI*	266	22	64	36
FRCA	10	10	0	0
GAEL	9	8	38	0
LECA	25	10	20	0
LUAR	185	19	5	5
SAME	324	32	38	16
TOTAL	2,119	220	43	19

* HMP Species

9.11.3 Discussion

9.11.3.1 Recommendations

HA 34 was in year 6 of monitoring in 2020; the only monitoring that occurred was photo documentation. Recommendations were developed from a combination of prior recommendations and revised success criteria established in 2020. The site met three out of five success criteria by 2019. Per recommendations in the 2017 Annual Habitat Restoration 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 are scheduled to be planted in the 2020/2021 and 2021/2022 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: the HMP shrub cover class was reduced from three to two; the HMP shrub cover by species was reduced for Monterey manzanita, Monterey ceanothus, and Hooker's manzanita from 31 percent, 7 percent, and 4 percent respectively, to equal or greater than 1 percent for each species; and future plantings of the HMP shrub species will be concentrated in the middle portion of the site that has shown good recovery and better soil conditions (USFWS, 2020). The updated success criteria are reflected in Table 9-96.

The Army recommends installing an additional monitoring transect to get data representative of the site's condition in the area deemed suitable for planting HMP shrub species before year 8 monitoring occurs. Additionally, the Army recommends restoring the access road. This would require ripping the road carefully to avoid creating erosion and applying mulch, seed, and installing plants on the ripped area. Overall, HA 34 needs time to respond to the restoration effort and continued monitoring to

evaluate areas that require additional effort. A qualitative overview was documented by photo points (see Appendix D, page D-12).

The site will continue to be monitored by photo documentation, species richness meandering transects, and vegetative cover line-intercept transects in monitoring year 8, 2022 (see Table 9-89). Table 9-96 summarizes the current status of HA 34 including which success criteria were met and recommendations.

Table 9-96. Status and Recommendations for Achieving Success Criteria at HA 34

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	Yes	None
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover‡	No	Fulfill SSRP plant targets* Install additional transect in area suitable for planting manzanita species†
Objective 3 – No. 4	HMP shrub cover by species‡	No	Fulfill SSRP plant targets* Install additional transect in area suitable for planting manzanita species†
Objective 3 – No. 4	HMP annual density	NA	NA

* Recommendation repeated from the 2017 Annual Habitat Restoration Report (Burleson, 2018).

† Not scheduled

‡ Success criteria updated by USFW (USFWS, 2020)

9.11.3.2 Plant Survivorship

Plant survivorship was moderate for the 2016 planting and low for the 2017 and 2019 plantings at HA 34. Shaggy-bark manzanita, Monterey ceanothus, and yellow bush lupine had low survivorship for all three planting events. Chamise, California sagebrush, Hooker's manzanita, Monterey manzanita, and black sage had low survivorship for the 2017 and 2019 plantings and moderate to high survivorship in the 2016 planting. California coffeeberry, coast silk tassel (*Garrya elliptica*), and pitcher sage were only installed in 2019 and had low survivorship. Silver bush lupine was only installed in the 2017 planting and had low survivorship. Coyote brush had moderate survivorship in the 2019 planting and high survivorship in the 2016 and 2017 planting. It is not surprising that both lupine species had low survivorship since these species did poorly at multiple sites. However, many other species planted at HA 34 also had low survivorship.

The low plant survivorship is likely due to site conditions that are not conducive to plant growth. HA 34 lacks top soil and is highly compacted; these factors contribute to sheet flow and inhibit water infiltration. Several areas at HA 34 were mulched which should prevent erosion and help with water retention (Kemron, 2018). The 2019 planting will be monitored for one more year.

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 acre (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, and 2020. Monitoring began in 2013. HA 36 was monitored for ten years by photo documentation and site visits and four years for species richness and vegetative cover (see Table 9-97). Figure 9-58 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 36 are summarized in Table 9-98.

Table 9-97. Historic Summary of Restoration and Monitoring Activities at HA 36

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

* Photo points and site visits occur every year regardless of the monitoring year

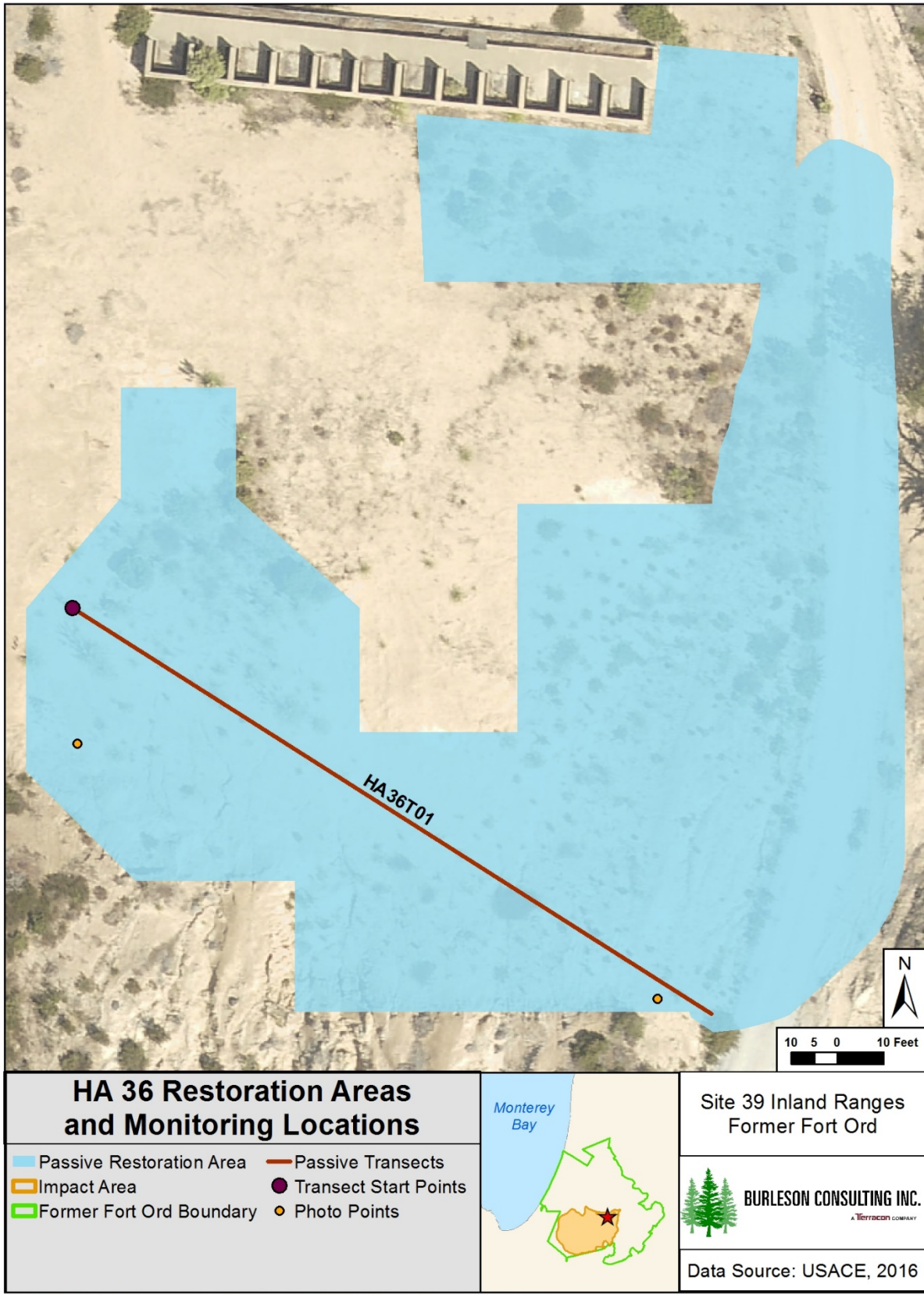


Figure 9-58. HA 36 Restoration Areas and Monitoring Locations Map

Table 9-98. 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 No net-loss of HMP shrubs, percent cover, density, diversity must equal baseline HMP data	Cover class: 3 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 9-98. 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, and 2020. The total amount of seed broadcast on site was 44.508 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 9-99 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 9-99. Summary of Passive Restoration Activities for HA 36

Species	Pounds of Seed Broadcast							
	SSRP Target	2012 (Jan)	2012 (Dec)	2016	2018	2019	2020	Total by Species
ACMI	-	-	-	0.900	1.200	0.300	4.400	6.800
ACGL	1.000	0.500	0.507	1.800	-	-	4.800	7.607
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	8.000
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	4.650
TOTAL	12.775	4.102	8.756	7.400	10.500	3.250	10.500	44.508

* HMP species

No active restoration was prescribed at HA 36 however, an AMP planting event occurred in 2020 per recommendations made in the 2017 Annual Reports (Burleson, 2018). A total of 709 plants were installed at HA 36. Table 9-100 summarizes the plants installed during active restoration. Additionally, BRAC staff installed approximately 300 surplus plants in 2014 and 100 surplus plants in 2017.

Table 9-100. Summary of Active Restoration Activities for HA 36

Species	Number of Individual Plants	
	2020	Total by Species
ACGL	80	80
ACMI	10	10
ADFA	37	37
ARCA	29	29
ARHO*	50	50
ARMO*	59	59
ARPU*	17	17
ARTO	60	60
BAPI	23	23
CERI*	37	37
CRSC	56	56
DIAU	50	50
HOCU	76	76
LUAR	50	50
SAME	75	75
TOTAL	709	709

*HMP species

9.12.2 Monitoring Results

9.12.2.1 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 36. Therefore, no HMP annuals need to be present at this restoration site.

9.12.2.2 Plant Survivorship

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

9.12.2.3 Species Richness

Sixty-two species were observed at HA 36. Of those, 32 were native shrubs or perennials, nine were native annual herbaceous species, and 21 were non-native species (see Table 9-101). Species richness increased by 19 species since 2018. Native shrub and perennial species increased by three, native herbaceous species increased by six, and non-native species increased by ten.

Table 9-101. Species Observed on HA 36, 2020

Scientific Name	Common Name	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon americanus</i> var. <i>americanus</i>	Spanish clover	ACAMA	NF
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon heermannii</i> var. <i>orbicularis</i>	Heermann's lotus	ACHEO	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Agrostis hallii</i>	Hall's bent grass	AGHA	NP
<i>Aira caryophylla</i>	silver hair grass	AICA	NNF
<i>Arctostaphylos hookeri</i> *	Hooker's manzanita	ARHO	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Artemisia californica</i>	California sagebrush	ARCA	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Briza maxima</i>	rattlesnake grass	BRMA	NNF
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Carex</i> sp.	sedge	CA	NP
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI	NNF
<i>Eschscholzia californica</i>	California poppy	ESCA	NF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Frangula californica</i>	California coffeeberry	FRCA	NP

Table 9-101. Species Observed on HA 36, 2020

Scientific Name	Common Name	Code	Category
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Gastridium phleoides</i>	nit grass	GAPH	NNF
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Juncus bufonius</i>	toad rush	JUBU	NF
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Lupinus bicolor</i>	miniature lupine	LUBI	NF
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Pinus radiata</i>	Monterey pine	PIRA	NP
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Plantago lanceolata</i>	English plantain	PLLA	NNF
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	POMO	NNF
<i>Pseudognaphalium californicum</i>	California everlasting	PSCA	NP
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU	NNF
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Rubus ursinus</i>	California blackberry	RUUR	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Sagina decumbens ssp. occidentalis</i>	Western pearlwort	SADEO	NF
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Senecio glomeratus</i>	cutleaf burnweed	SEGL	NNF
<i>Sisyrinchium bellum</i>	western blue-eyed grass	SIBE	NP
<i>Sonchus asper</i>	prickly sow thistle	SOAS	NNF
<i>Stipa pulchra</i>	purple needle grass	STPU	NP
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN	NNF
<i>Trifolium campestre</i>	hop clover	TRCA	NNF
<i>Zeltnera davyi</i>	Davy's centaury	ZEDA	NF

* HMP species

9.12.2.4 Vegetative Cover

One 50-meter line-intercept transect survey was completed at HA 36. The survey indicates that vegetative cover by native shrubs and perennials was 5.98%. The mean vegetative cover by native shrubs and perennials decreased from 2018 to 2020 by 4.24%. Table 9-102 summarizes vegetative cover and Table 9-103 presents vegetative cover by species. Figure 9-59 presents the percent cover of dominant species at HA 36 in 2016, 2017, 2018, and 2020.

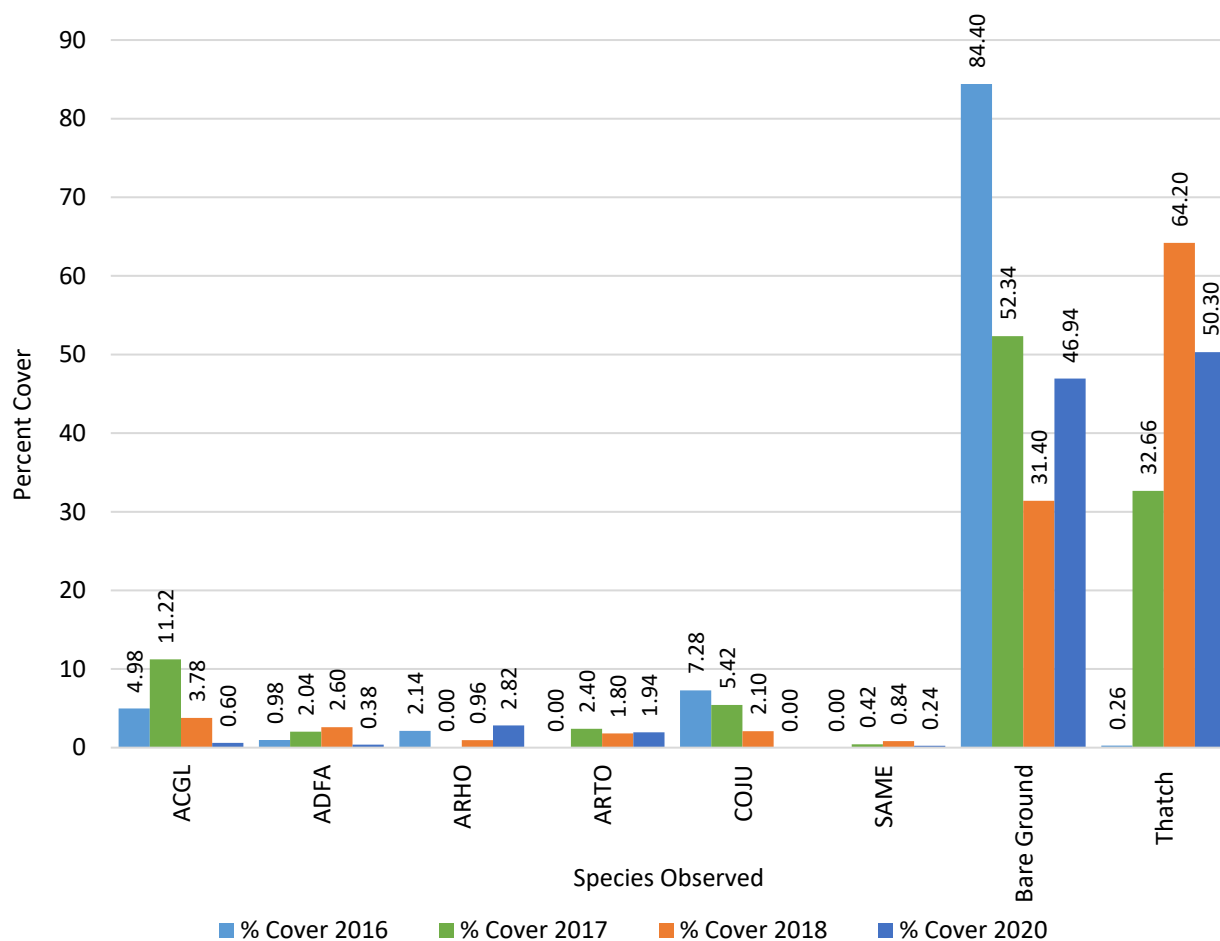
Table 9-102. Transect Survey Summary for HA 36

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA36T01	5.98	5.98	0.00	50.30	46.94
SITE AVERAGE	5.98	5.98	0.00	50.30	46.94

Table 9-103. Transect Survey Results for HA 36 by Species

Transect	ACGL (%)	ADFA (%)	ARHO* (%)	ARTO (%)	SAME (%)	TH (%)	BG (%)
HA36T01	0.60	0.38	2.82	1.94	0.24	50.30	46.94
SITE AVERAGE	0.60	0.38	2.82	1.94	0.24	50.30	46.94

* HMP Species

**Figure 9-59.** Percent Cover of Dominant Species at HA 36 in 2016, 2017, 2018, and 2020.

9.12.3 Discussion

9.12.3.1 Recommendations

HA 36 was in year 8 of monitoring in 2020. The site met two out of five success criteria by 2020. Per recommendations in the 2017 Annual Habitat Restoration Report, HA 36 received additional planting of Hooker's manzanita, Monterey manzanita, and Monterey ceanothus in the 2019/2020 season and will receive sandmat manzanita and Eastwood's goldenbush in the 2021/2022 season (Burleson, 2018). The Army is considering adding an additional monitoring transect to get data representative of the site's condition. Otherwise, HA 36 needs time to respond to restoration efforts. A qualitative overview was documented by photo points (see Appendix D, page D-13 and Appendix F, page F-9).

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 9-97). Table 9-104 summarizes the current status of HA 36 including which success criteria were met and recommendations.

Table 9-104. Status and Recommendations for Achieving Success Criteria at HA 36

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Plant native species (scheduled 2021/2022)*
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Plant sandmat manzanita and Eastwood's goldenbush* (scheduled 2021/2022) Plant Monterey manzanita and Monterey ceanothus†
Objective 3 – No. 4	HMP shrub cover by species	No	Plant sandmat manzanita and Eastwood's goldenbush* (scheduled 2021/2022) Plant Monterey manzanita and Monterey ceanothus†
Objective 3 – No. 4	HMP annual density	NA	NA

* Recommendation repeated from the 2017 Annual Habitat Restoration Report (Burlison, 2018).

† Not scheduled

9.12.3.2 HMP Annual Density

The baseline data from the SSRP indicated no HMP annual species at HA 36. Therefore, no HMP annuals need to be present at this restoration site.

9.12.3.3 Plant Survivorship

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

9.12.3.4 Species Richness

Chamise, sandmat manzanita, Monterey manzanita, shaggy-bark manzanita, coyote brush, Monterey ceanothus, golden yarrow, peak rush-rose, wedge-leaved horkelia, deerweed, and black sage were all present. HA 36 included 32 native shrub and perennial species and met the success criterion for Objective 1.

9.12.3.5 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 15 shrub and perennial species presented in Table 2 of the HA 36 SSRP (Burlison, 2013). Currently the HA contains 5.98% vegetative cover; therefore, this success criterion was not met (see Figure 9-60).

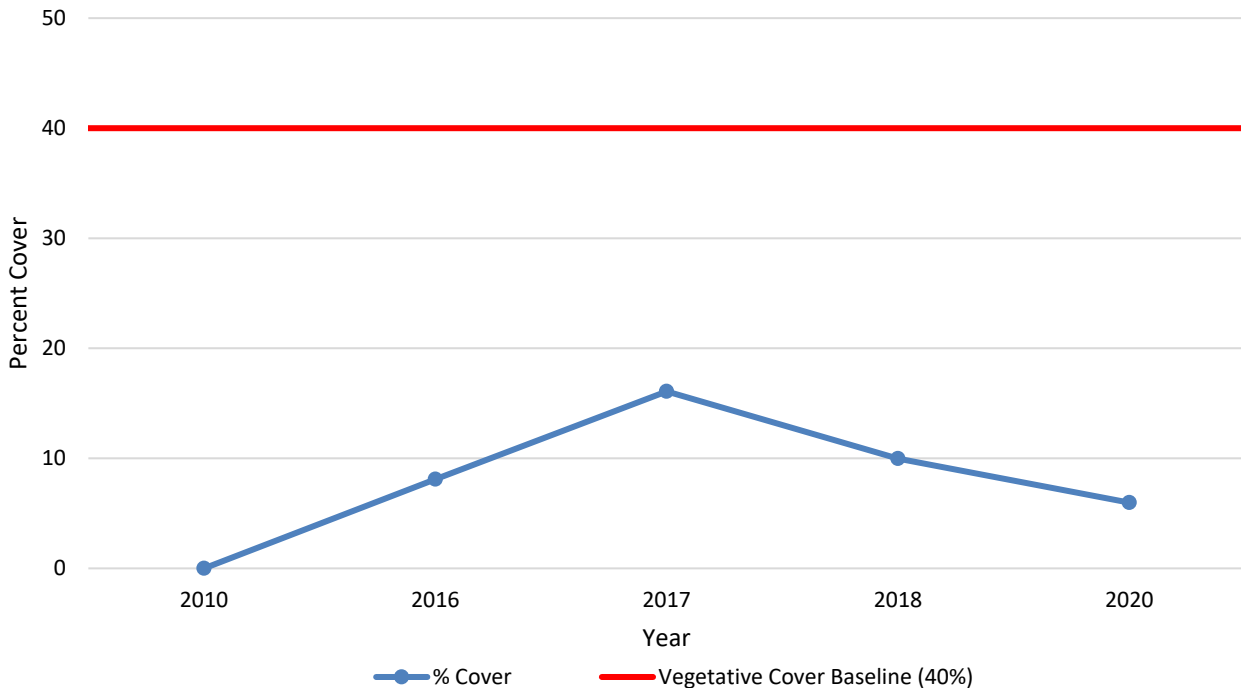


Figure 9-60. Native Vegetative Cover Compared to the Success Criterion at HA 36

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 36 provided an absolute cover of 2.82%; therefore, the success criterion was not met. The second success criterion is no net loss of HMP shrubs. For HA 36, this means a vegetative cover average of at least 2% cover for sandmat manzanita, 9% for Monterey manzanita, 12% for Monterey ceanothus, 1% for Hooker's manzanita, and 1% for Eastwood's goldenbush. The average vegetative cover for sandmat manzanita was 0.00%, Monterey manzanita was 0.00%, Monterey ceanothus was 0.00%, Hooker's manzanita was 2.82%, and Eastwood's goldenbush was 0.00% (see Figure 9-61). In 2020, only one of the five species, Hooker's manzanita, met the acceptable limit. Therefore, the success criterion was not met.

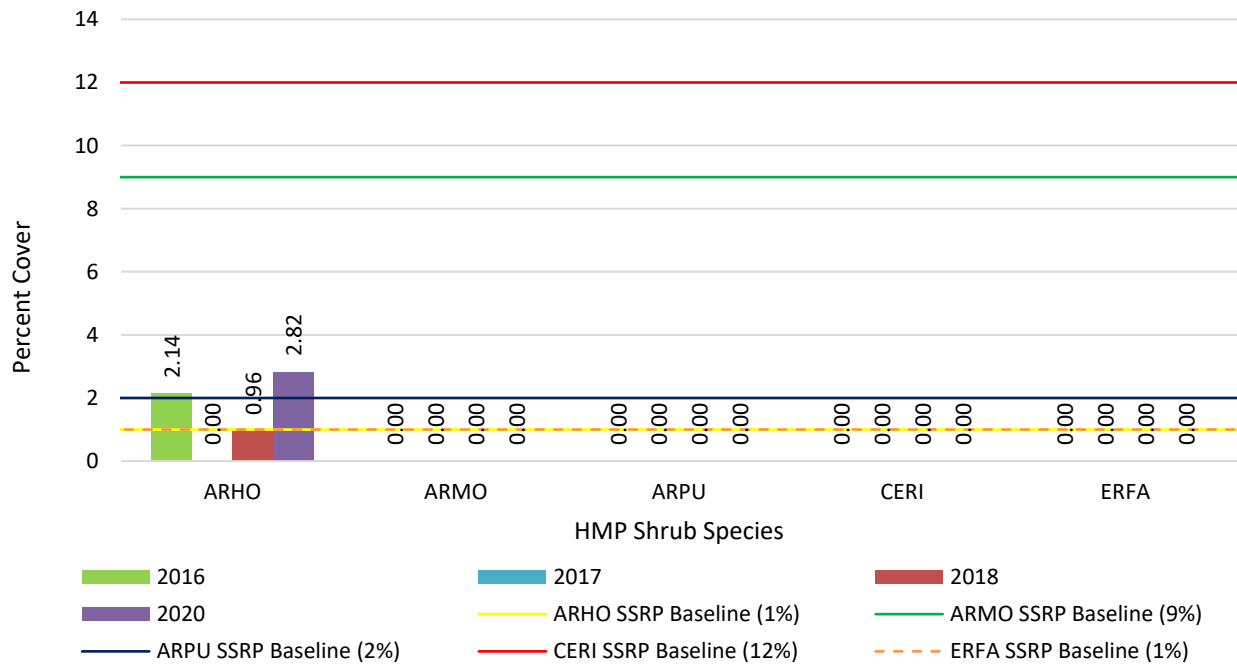


Figure 9-61. HMP Shrub Species Comparison to Success Criteria at HA 36

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 9.4 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 CTS 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 restoration procedure 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 began in 2013 and is ongoing. Monitoring began in 2015. HA 37 was monitored for eight years by photo documentation and site visits; six years for HMP annual density in plots; five years for HMP annual density across the HA; four years for species richness and vegetative cover; and seven years for plant survivorship (see Table 9-105). Figure 9-62 shows the HA footprint, restoration areas, and transect survey locations. Success criteria for HA 37 are summarized in Table 9-106.

Table 9-105. Historic Summary of Restoration and Monitoring Activities at HA 37

Activity	Monitoring Years									
			1	2	3	4	5	6	8	13
	2013	2014	2015	2016	2017	2018	2019	2020	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		●	●	●	●	●	●	●	●	

* Photo points and site visits occur every year regardless of the monitoring year

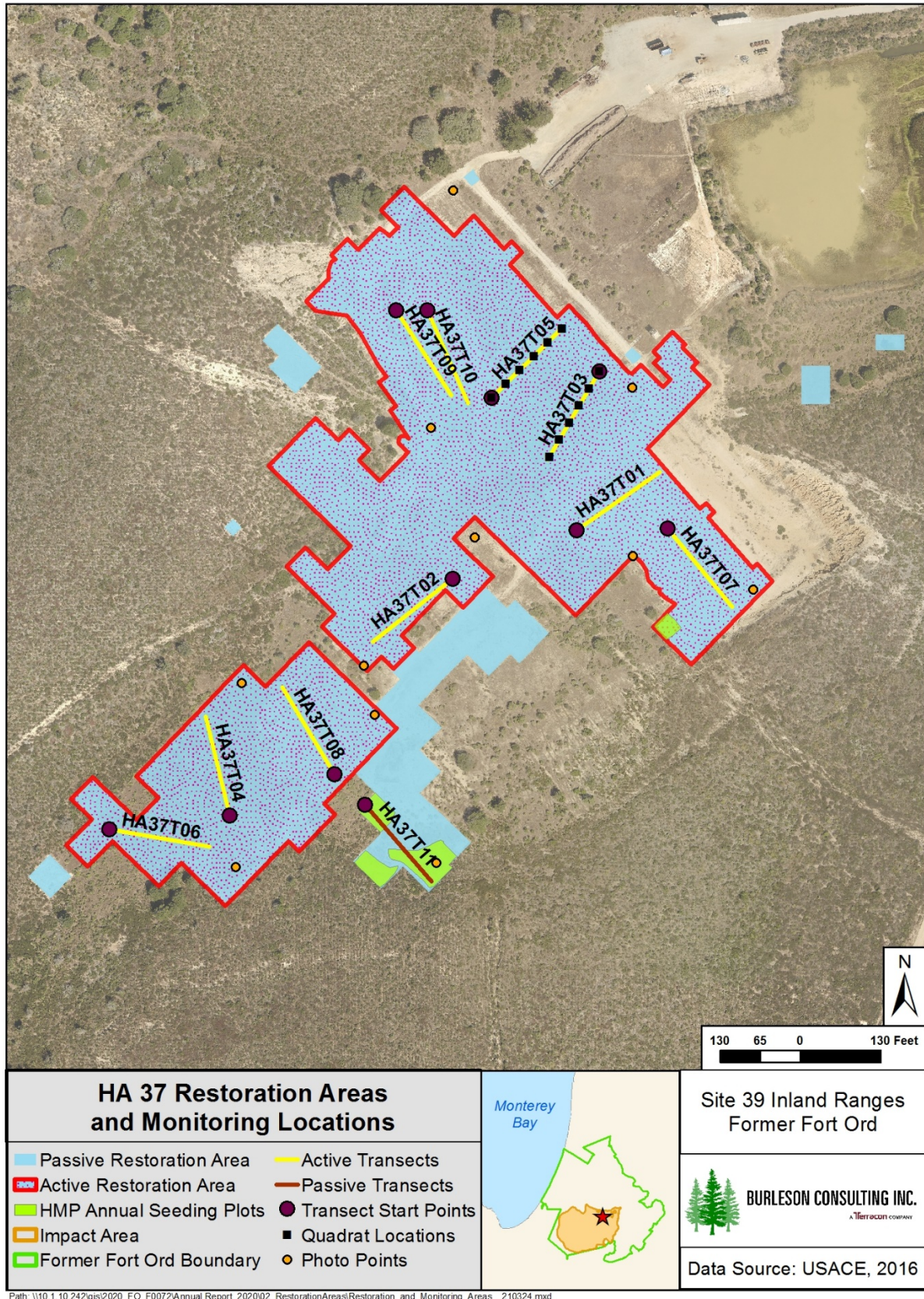


Figure 9-62. HA 37 Restoration Areas and Monitoring Locations Map

Table 9-106. 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 (<i>Genista</i> 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
		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 9-106. 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 in 2014, 2015, 2016, 2017, 2018, 2019, and 2020. The total amount of seed broadcast on site was 923.41 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 9-107 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.

Table 9-107. Summary of Passive Restoration Activities for HA 37

Species	Pounds of Seed Broadcast									
	SSRP Target	2014 (Jan)	2014	2015	2016	2017	2018	2019	2020	Total by Species
ACMI	9.40	4.80	2.00	8.07	8.14	8.70	1.80	2.95	17.60	54.06
ACGL	18.70	8.70	4.00	10.34	16.10	5.90	-	1.50	20.80	67.34
ADFA	-	3.30	-	-	-	-	-	-	-	3.3
ARCA	-	-	-	2.40	-	-	-	-	-	2.4
BAPI	1.40	1.40	0.32	0.52	-	0.15	-	0.08	0.12	2.59
CERI*	9.40	-	2.00	2.67	-	1.00	-	0.50	0.80	6.97
CHPUP*	1.40	-	0.32	0.04	-	-	-	-	1.04	1.4
CRSC	7.00	5.20	1.52	2.60	-	0.75	-	0.38	0.60	11.05
DIAU	1.40	0.10	0.32	0.28	-	0.15	-	0.08	0.12	1.05
ELGL	28.10	100.00	69.00	69.01	19.58	40.74	7.20	6.70	28.80	341.03
ERCO	11.70	5.00	1.44	1.06	-	1.25	-	0.63	1.00	10.38
ERER	-	4.20	-	-	-	-	-	-	-	4.2
ERFA*	1.90	-	1.40	0.05	-	0.20	-	0.10	0.16	1.91
GAEL	-	-	-	-	-	1.00	-	0.50	-	1.5
HO	93.50	50.00	20.00	52.70	3.12	113.00	3.60	5.00	8.00	255.42
HOCU	18.70	16.10	47.60	5.34	16.10	5.40	2.40	1.53	-	94.47
LUAR	-	-	1.52	2.40	-	-	-	-	-	3.92
LUAL	7.00	-	-	-	-	0.75	-	-	-	0.75
LUCH	-	-	-	-	-	-	-	0.38	0.60	0.98
LUNA	-	-	-	0.27	-	1.00	-	0.28	1.02	2.57
SAME	18.70	7.10	4.00	2.94	-	2.00	-	1.00	1.60	18.64
STCE	-	-	-	0.54	-	2.00	-	-	-	2.54
STPU	18.70	-	-	5.34	10.10	9.75	4.50	5.25	-	34.94
TOTAL	247.00	205.90	155.44	166.57	73.14	193.74	19.50	26.86	82.26	923.41

* HMP species

Active restoration was conducted in 2014, 2015, 2016, 2017, and 2020. The total number of plants installed at HA 37 was 17,680 compared to 17,300 prescribed in the SSRP. Table 9-108 summarizes the plants installed during active restoration.

Table 9-108. Summary of Active Restoration Activities in HA 37

Species	Number of Individual Plants						
	SSRP Target	2014	2015	2016	2017	2020	Total by Species
ACMI	800	13	252	244	171	35	715
ACGL	1,000	380	208	213	20	33	854
ADFA	1,700	636	363	316	140	118	1,573
ARCA	-	-	-	-	155	24	179
ARHO*	700	234	325	270	157	19	1,005
ARMO*	1,000	389	370	141	206	33	1,139
ARPU*	1,000	-	100	220	237	25	582
ARTO	2,500	621	554	497	356	95	2,123
BAPI	800	234	284	431	329	71	1,349
CERI*	1,000	315	652	239	140	32	1,378
CRSC	1,000	389	208	22	286	33	938
DIAU	800	389	250	437	380	34	1,490
ERCO	500	311	182	-	227	25	745
FRCA	-	-	-	-	-	7	7
GAEL	500	-	-	17	2	25	44
HOCU	1,000	389	258	32	395	33	1,107
LECA	-	-	-	-	-	20	20
LUAL/LUCH	1,000	-	165	146	242	33	586
LUAR	1,000	208	243	175	262	33	921
SAME	1,000	362	250	15	258	40	925
TOTAL	17,300	4,870	4,664	3,415	3,963	768	17,680

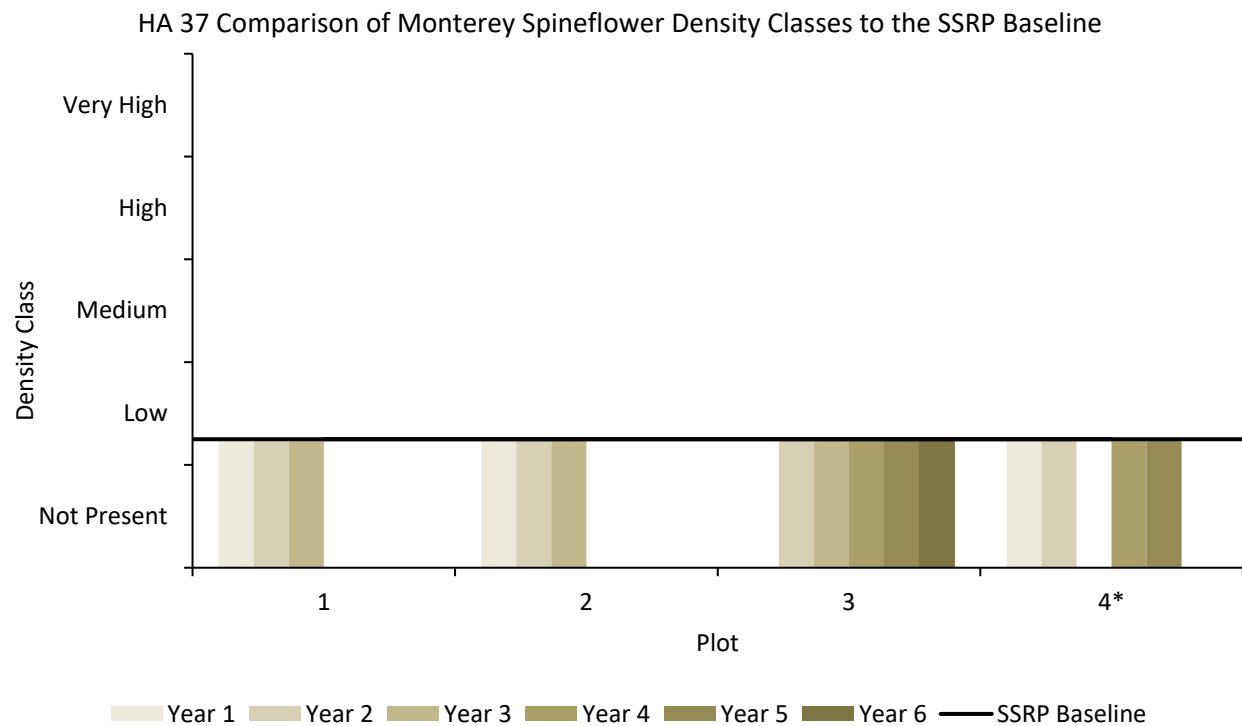
* HMP species

9.13.2 Monitoring Results

HA 37 was in year 6 of monitoring in 2020. Year 6 was not a required monitoring year however HMP annual density surveys, plant survivorship monitoring, and photo documentation were completed.

9.13.2.1 HMP Annual Density

Four Monterey spineflower restoration plots were monitored for year 5 (Plot 4) and year 6 (Plots 1-3) density at HA 37 in 2020. The plots are numbered 1-4 on Figure 9-64 and are located throughout HA 37. Monterey spineflower density was low at Plots 3 and 4. Monterey spineflower was not present at Plots 1 and 2. Figure 9-63 represents Monterey spineflower restoration plot densities for HA 37.



* Plot 4 was established in Nov 2015 and has only been monitored for years 1, 2, 3, 4, and 5

Figure 9-63. HA 37 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-4

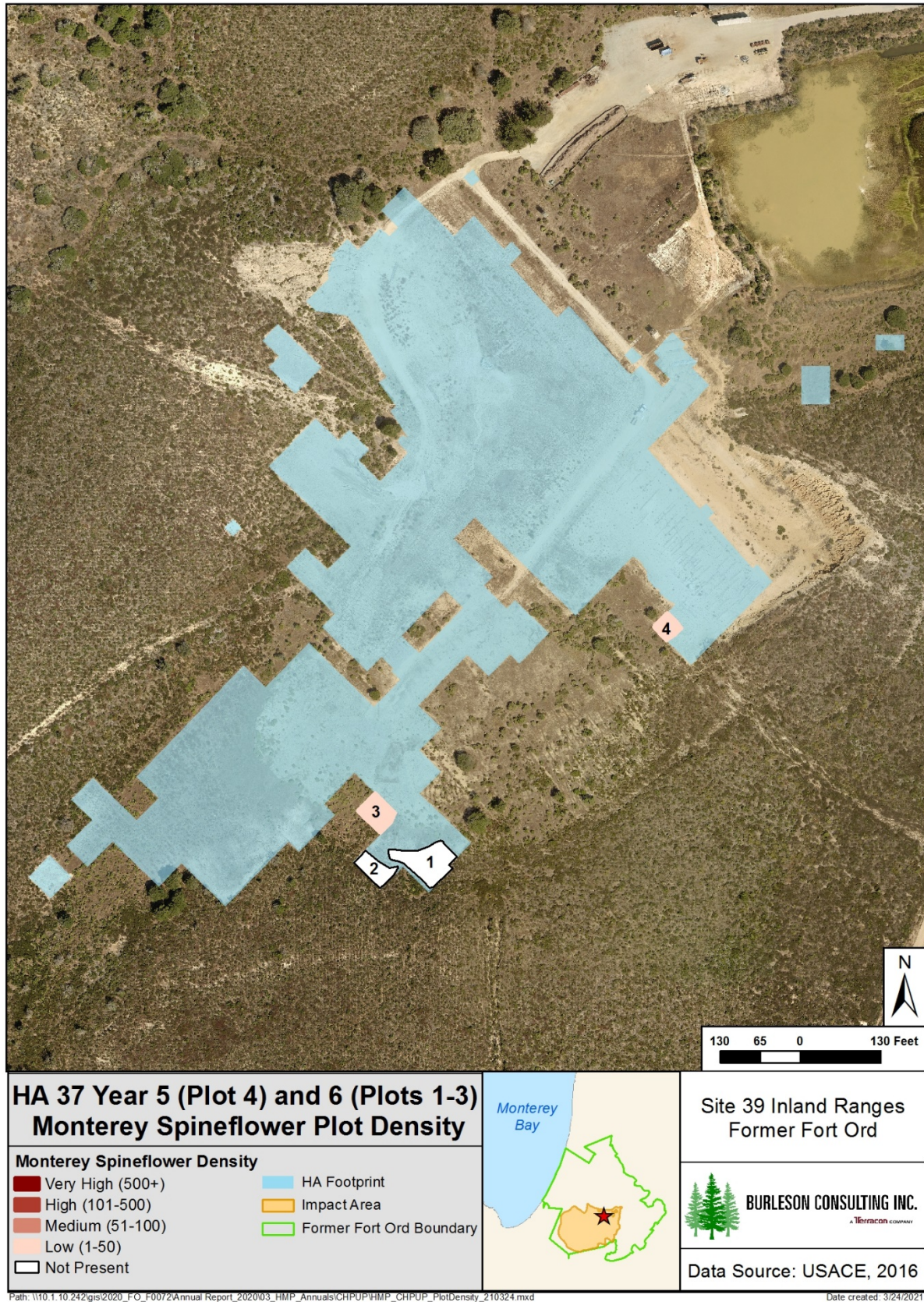
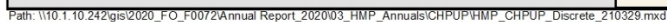


Figure 9-64. HA 37 Year 5 (Plot 4) and Year 6 (Plots 1-3) Monterey Spineflower Plot Density Map

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

One discrete patch and six individual plants of Monterey spineflower were counted and mapped at HA 37 in 2020 (see Figure 9-65). The density was low and the total acreage of Monterey spineflower patches with a density class of low was 0.01 acre. In 2019, densities and acreages were not calculated because no discrete patches were observed.



Date created: 3/29/2021

9.13.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 37 for plants installed in 2014, 2015, 2016, 2017, and 2020. A total of 12 shrub species and 1,205 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, and 50% for the 2017 planting. By the end of year 1 monitoring for the 2020 planting, survivorship was 62%. Tables 9-109 through 9-113 present results by species.

Table 9-109. 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 9-110. 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
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 9-111. 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
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 9-112. 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
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 9-113. Plant Survivorship Monitoring Summary for 2020 Plantings at HA 37

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2020)
			Alive (%)
ADFA	118	10	70
ARHO*	19	10	70
ARMO*	33	10	80
ARPU*	25	10	60
ARTO	95	10	90
BAPI	71	10	100
CERI*	32	10	60
GAEL	25	10	30
LUAR	33	10	30
LUCH	33	10	30
SAME	40	10	60
Total	524	110	62

* HMP Species

9.13.3 Discussion

9.13.3.1 Recommendations

HA 37 was in year 6 of monitoring in 2020; the only monitoring that occurred was photo documentation and HMP annual density surveys. The site met three out of six success criteria by 2020.

Recommendations were developed from a combination of prior recommendations and the restoration efforts completed in 2020. Per recommendations in the 2017 Annual Habitat Restoration Report, Monterey spineflower was broadcast to fulfill the SSRP target in the 2020/2021 season. The Army recommends fulfilling the SSRP planting prescription, scheduled for the 2020/2021 and 2021/2022 seasons, and waiting to see how the site responds (Burleson, 2018). A qualitative overview was documented by photo points (see Appendix D, page D-14).

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 8, 2022 (see Table 9-105). Table 9-114 summarizes the current status of HA 37 including which success criteria were met and recommendations.

Table 9-114. Status and Recommendations for Achieving Success Criteria at HA 37

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Fulfill SSRP plant targets* (scheduled 2020/2021 and 2021/2022)
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	No	Fulfill SSRP plant targets* (scheduled 2020/2021 and 2021/2022)
Objective 3 – No. 4	HMP shrub cover by species	No	Fulfill SSRP plant targets* (scheduled 2020/2021 and 2021/2022)
Objective 3 – No. 4	HMP annual density	Yes	None

* Recommendation repeated from the 2017 Annual Habitat Restoration Report (Burleson, 2018)

9.13.3.2 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 5 and year 6 Monterey spineflower restoration plot results show that the density met the success criterion under Objective 3 for two out of four plots. In addition, Monterey spineflower was present outside the restoration plots. Discrete patches, with density that met or exceeded the success criterion, covered 0.01 acre of HA 37.

9.13.3.3 Plant Survivorship

Plant survivorship was moderate for the 2014, 2017, and 2020 planting events and low for the 2015 and 2016 planting events at HA 37. Yellow bush lupine had low survivorship for all planting events. Monterey ceanothus had moderate survivorship in the 2020 planting events and low survivorship in all other planting events. Monterey manzanita and shaggy-bark manzanita had low survivorship in the 2015 and 2016 plantings, moderate survivorship in the 2014 and 2017 plantings, and high survivorship in the 2020 planting event. Coyote brush had low survivorship in the 2016 and 2017 planting events and moderate

to high survivorship in the 2014, 2015, and 2020 planting events. Black sage had low survivorship in the 2016 planting and moderate to high survivorship in the other plantings. Hooker's manzanita had high survivorship in the 2017 planting and moderate survivorship in all other planting events. Chamise had low survivorship in the 2017 planting and moderate to high survivorship in all other plantings. Sandmat manzanita had low survivorship in the 2017 planting event and moderate survivorship in the 2016 and 2020 planting events. Coast silk tassel had low survivorship in the 2016 and 2020 planting events and moderate survivorship in the 2017 planting. Silver beach lupine had low survivorship in the 2015, 2016, 2017, and 2020 planting events. California sagebrush was only installed during the 2017 planting event and had moderate survivorship. Low survivorship for Monterey ceanothus and lupine was not surprising because they had low survivorship at multiple sites, whereas Monterey manzanita and shaggy-bark manzanita typically did well at other sites. In 2017, manzanitas were installed in areas with sandy, well-drained soils while more tolerant species were planted in flatter areas with compact soils and occasional standing water.

9.13.3.4 Species Richness

No species richness survey occurred; therefore, no data were collected.

9.13.3.5 Vegetative Cover

No vegetative cover survey occurred; therefore, no data were collected.

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 restoration procedure 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 began in 2013 and was completed in 2017. Monitoring began in 2015 and additional seed was broadcast in 2020. HA 38 was monitored for eight years by photo documentation and site visits, six years for HMP annual density in plots, five years for HMP annual density across the HA, and four years for species richness, vegetative cover, and plant survivorship (see Table 9-115). Figure 9-66 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 38 are summarized in Table 9-116.

Table 9-115. Historic Summary of Restoration and Monitoring Activities at HA 38

Activity	Monitoring Years									
			1	2	3	4	5	6	8	13
	2013	2014	2015	2016	2017	2018	2019	2020	2022	2027
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		●	●	●	●					

* Photo points and site visits occur every year regardless of the monitoring year

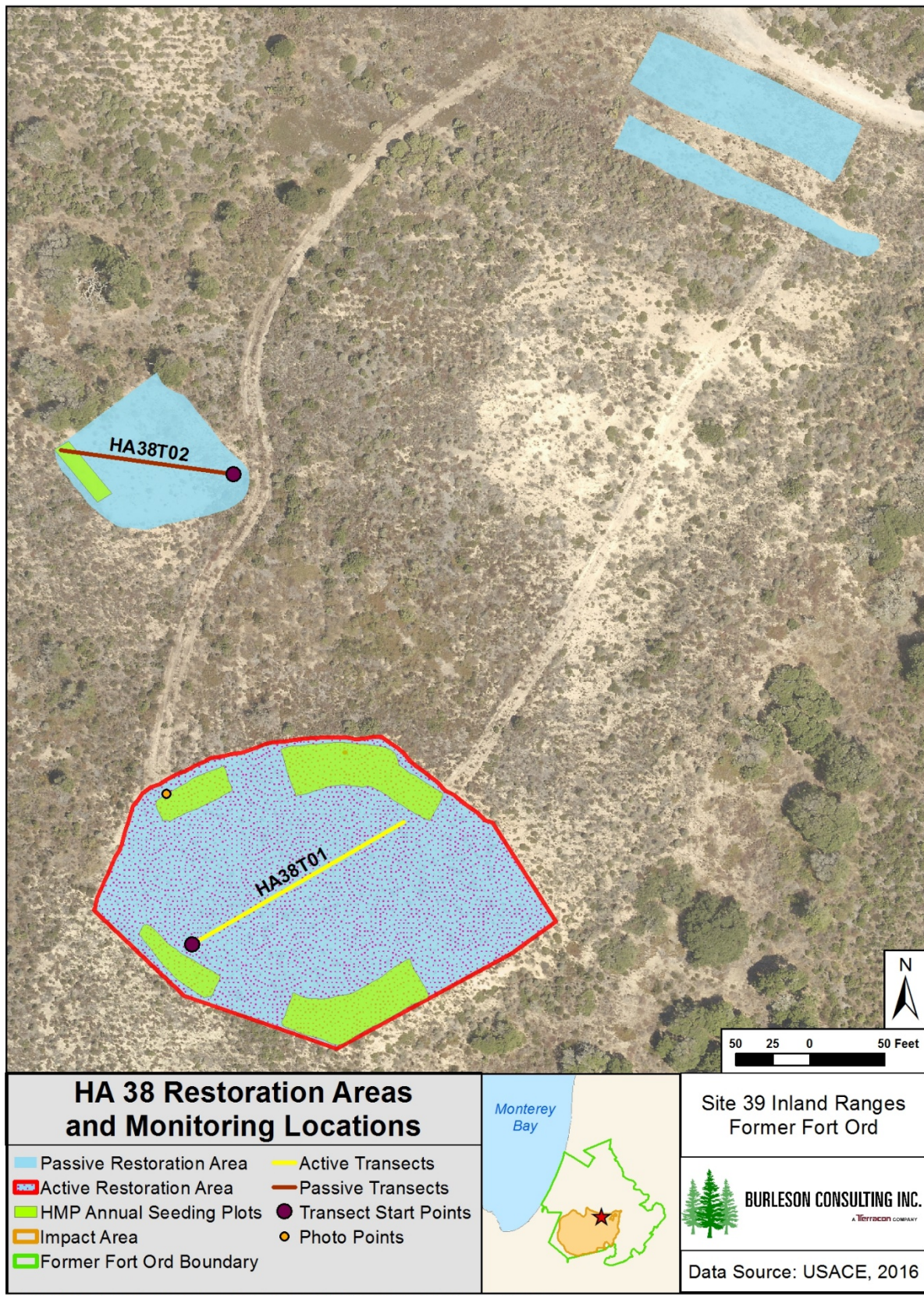


Figure 9-66. HA 38 Restoration Areas and Monitoring Locations Map

Table 9-116. 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 <i>Carpobrotus edulis</i> (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
		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, and 2020. The total amount of seed broadcast on site was 31.633 lb compared to 28.980 lb prescribed in the SSRP. Table 9-117 summarizes the SSRP seed target and the amount of seed applied by year and species. In 2017 and 2020, Burleson performed passive restoration for the HMP annual species Monterey spineflower, sand gilia, and seaside bird's beak. 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.

Table 9-117. Summary of Passive Restoration Activities for HA 38

Species	Pounds of Seed Broadcast						
	SSRP Target	2013	2014	2015	2017	2020	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	0.066
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	31.633

* HMP species

Active restoration was completed in 2014 and 2015 at HA 38. The total number of plants installed at HA 38 was 1,842, as prescribed in the SSRP. Table 9-118 summarizes the plants installed during active restoration.

Table 9-118. Summary of Active Restoration Activities for HA 38

Species	Number of Individual Plants			
	SSRP Target	2014	2015	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	-	82
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	1,842

* HMP species

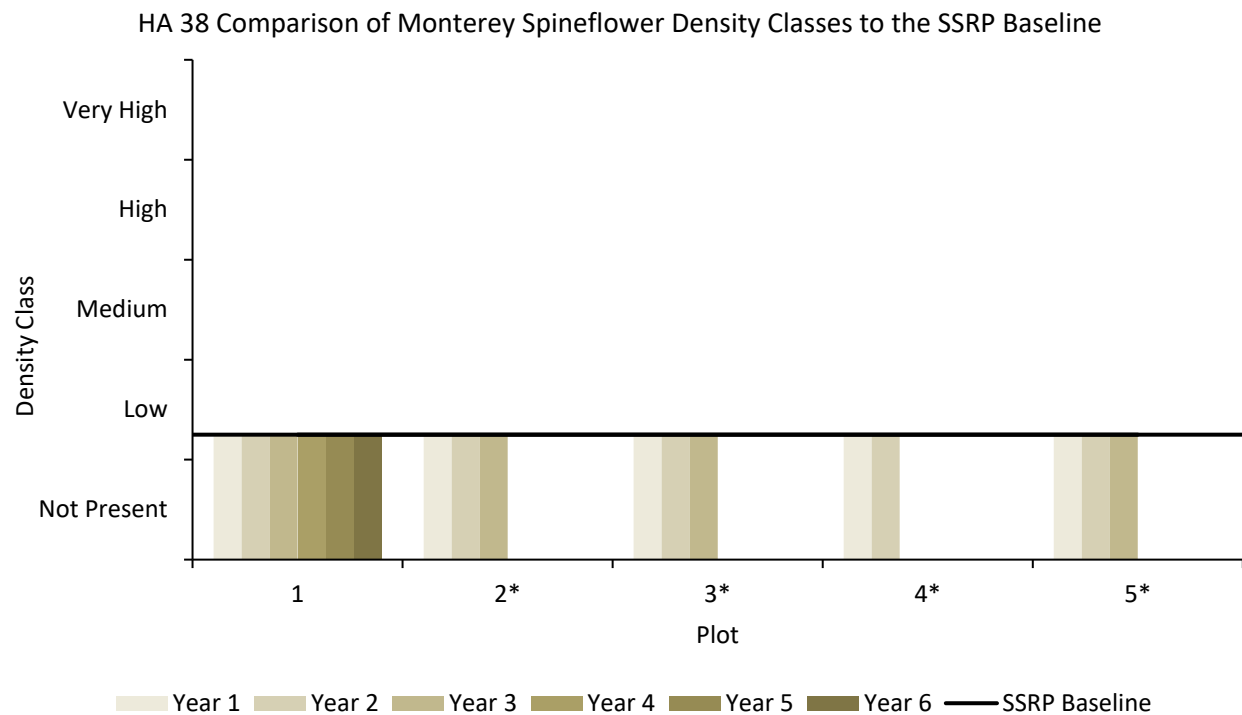
9.14.2 Monitoring Results

HA 38 was in year 6 of monitoring in 2020. Year 6 was not a required monitoring year however HMP annual density surveys and photo documentation were completed.

9.14.2.1 HMP Annual Density

Monterey spineflower and sand gilia restoration plots were monitored for density at HA 38.

Five Monterey spineflower restoration plots were monitored for year 3 (Plots 2-5) and year 6 (Plot 1) density at HA 38 in 2020. The plots are numbered 1-5 on Figure 9-68 and are located throughout HA 38. Monterey spineflower density was low at Plots 1, 2, 3, and 5. Monterey spineflower was not present at Plot 4. Figure 9-67 presents Monterey spineflower restoration plot densities for HA 38.



* Plots 2-5 were established in 2017 and have only been monitored for years 1, 2, and 3.

Figure 9-67. HA 38 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1-5

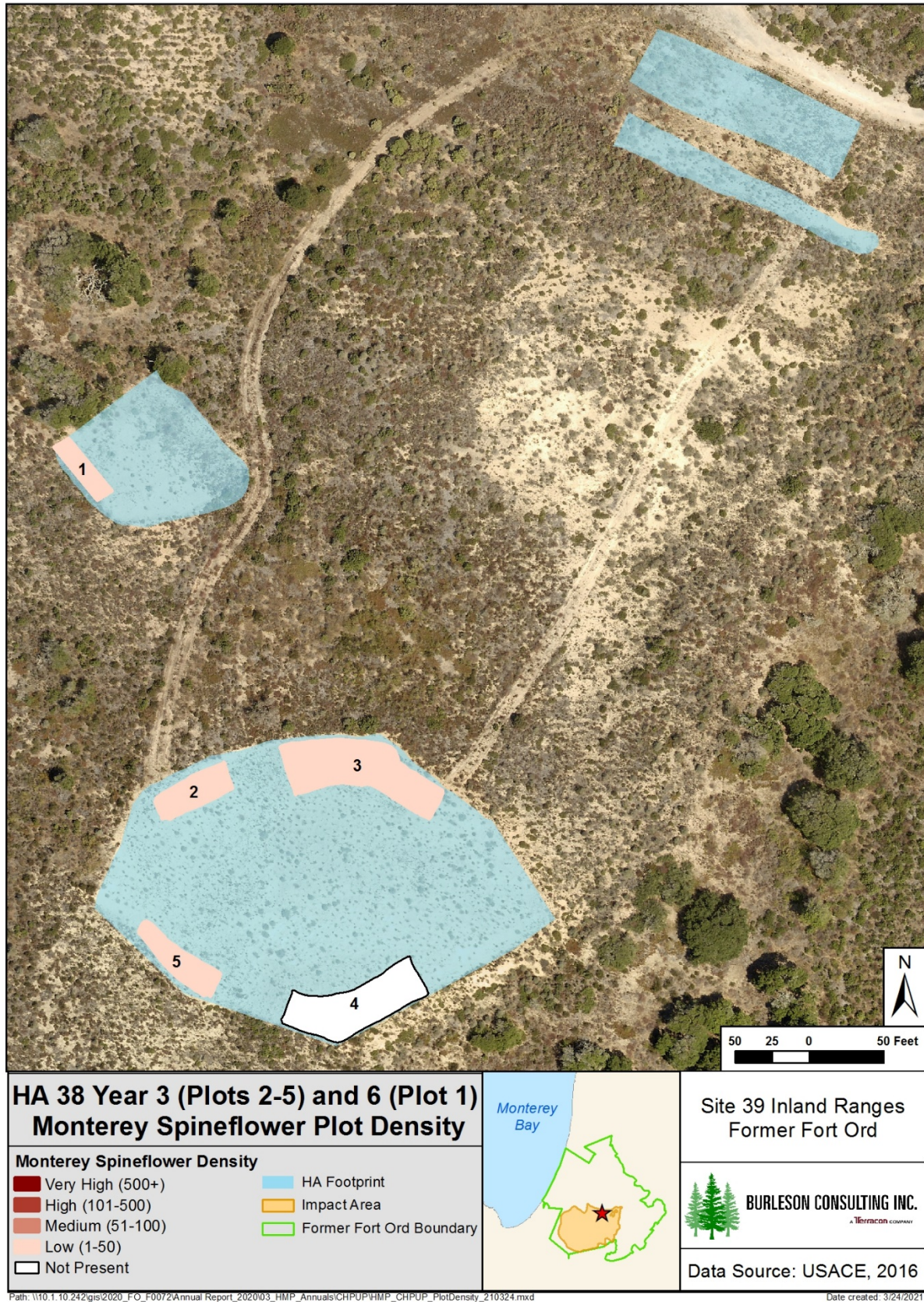


Figure 9-68. HA 38 Year 3 (Plots 2-5) and Year 6 (Plot 1) Monterey Spineflower Plot Density Map

Four sand gilia restoration plots were monitored for year 3 density at HA 38 in 2020. The plots are numbered 1-4 on Figure 9-70 and are located throughout HA 38. Sand gilia density was low at Plots 1, 2, and 3. Sand gilia was not present at Plot 4. Figure 9-69 presents sand gilia restoration plot densities for HA 38.

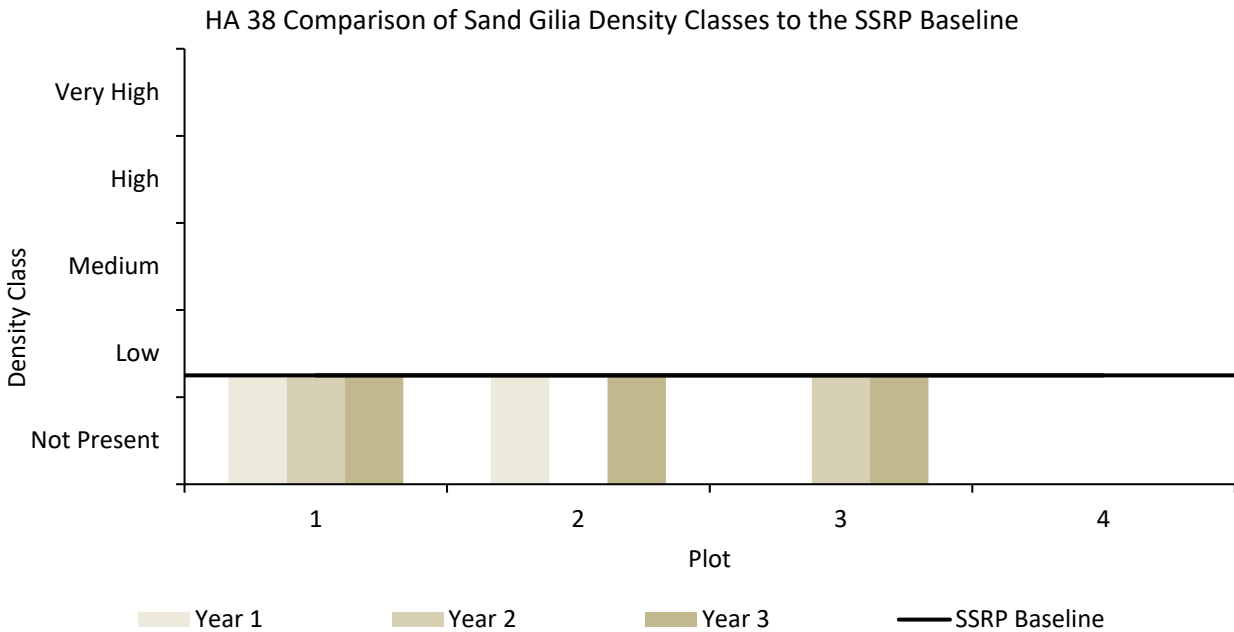


Figure 9-69. HA 38 Comparison of Sand Gilia Density Classes to the SSRP Baseline for Plots 1-4

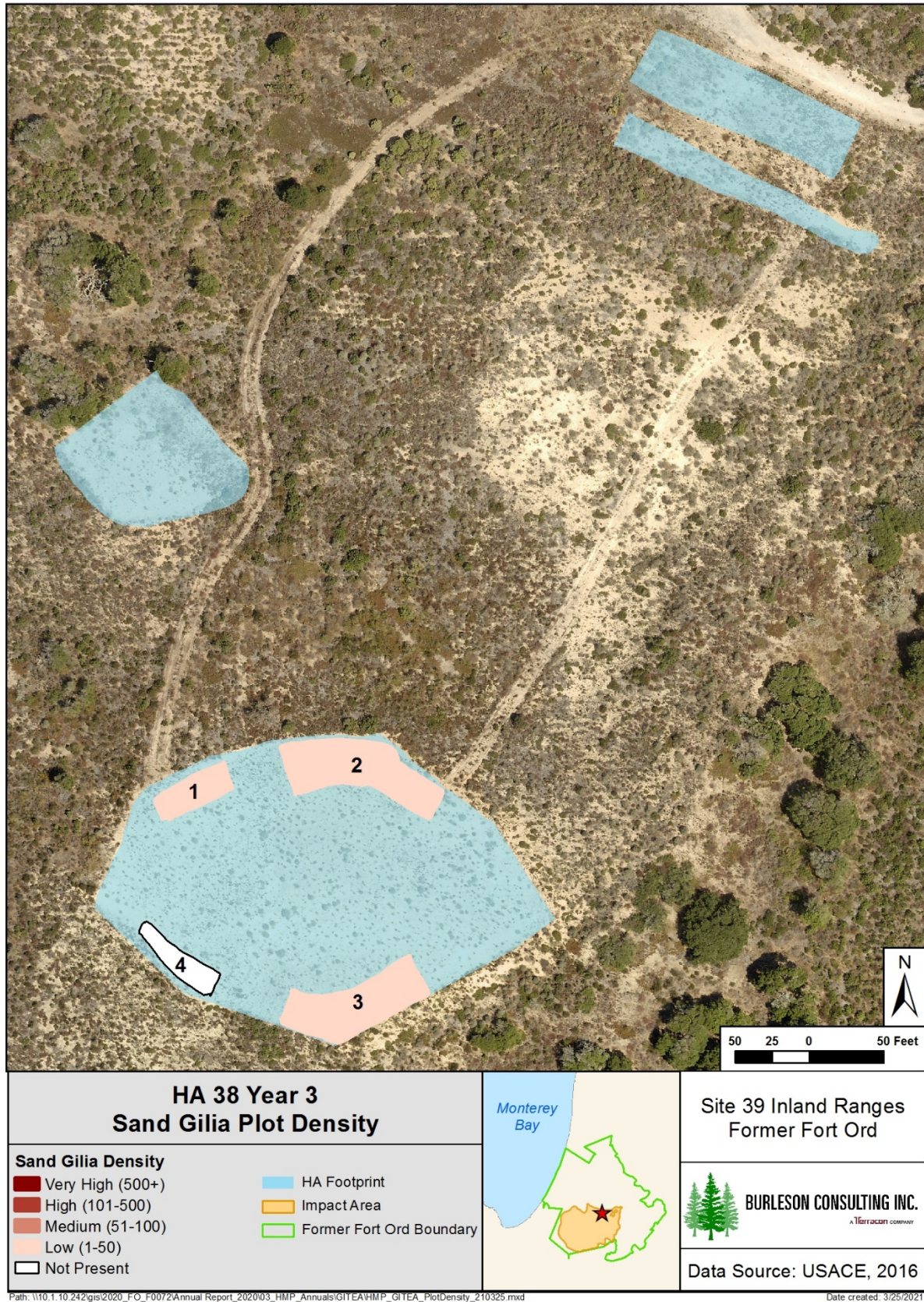


Figure 9-70. HA 38 Year 3 (Plots 2-5) and Year 6 (Plot 1) Sand Gilia Plot Density Map

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 Monterey spineflower, sand gilia, and seaside bird's beak at HA 38.

Thirty-six individual plants and seven discrete patches of Monterey spineflower were mapped and individual plants were counted within each patch (see Figure 9-71). 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 0.1 acre. From 2019 to 2020, the density range remained the same and acreage above the SSRP baseline decreased.

Forty-nine individual plants and four discrete patches of sand gilia were mapped and individual plants were counted within each patch (see Figure 9-72). Densities ranged from low to medium and the total acreage of sand gilia patches with a density at or above the SSRP baseline density class of low was 0.008 acre. From 2019 to 2020, the density range and acreage above the SSRP baseline decreased.

Seaside bird's beak was not observed at HA 38 in 2020 which is consistent with previous monitoring years.

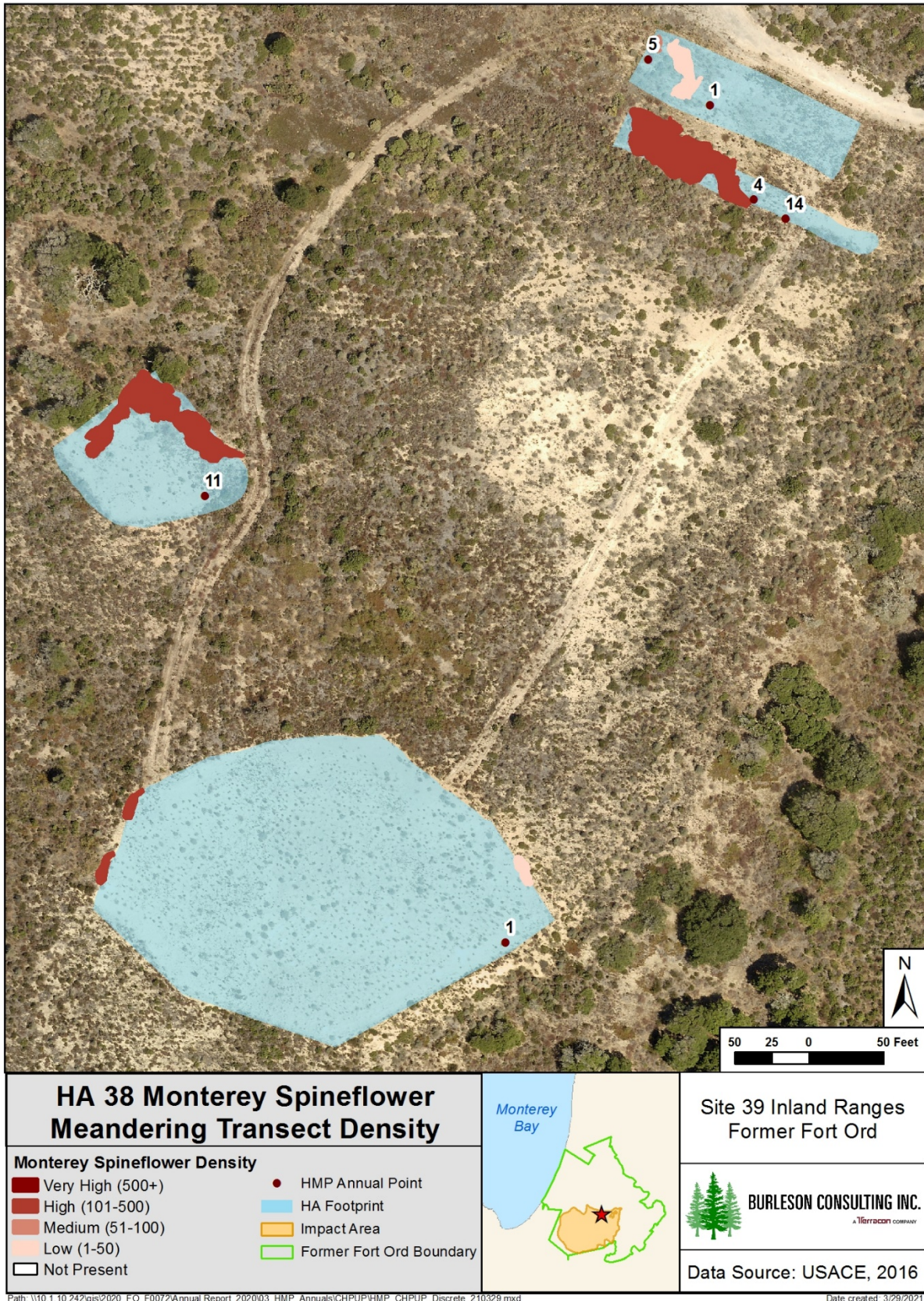


Figure 9-71. HA 38 Monterey Spineflower Meandering Transect Density Map

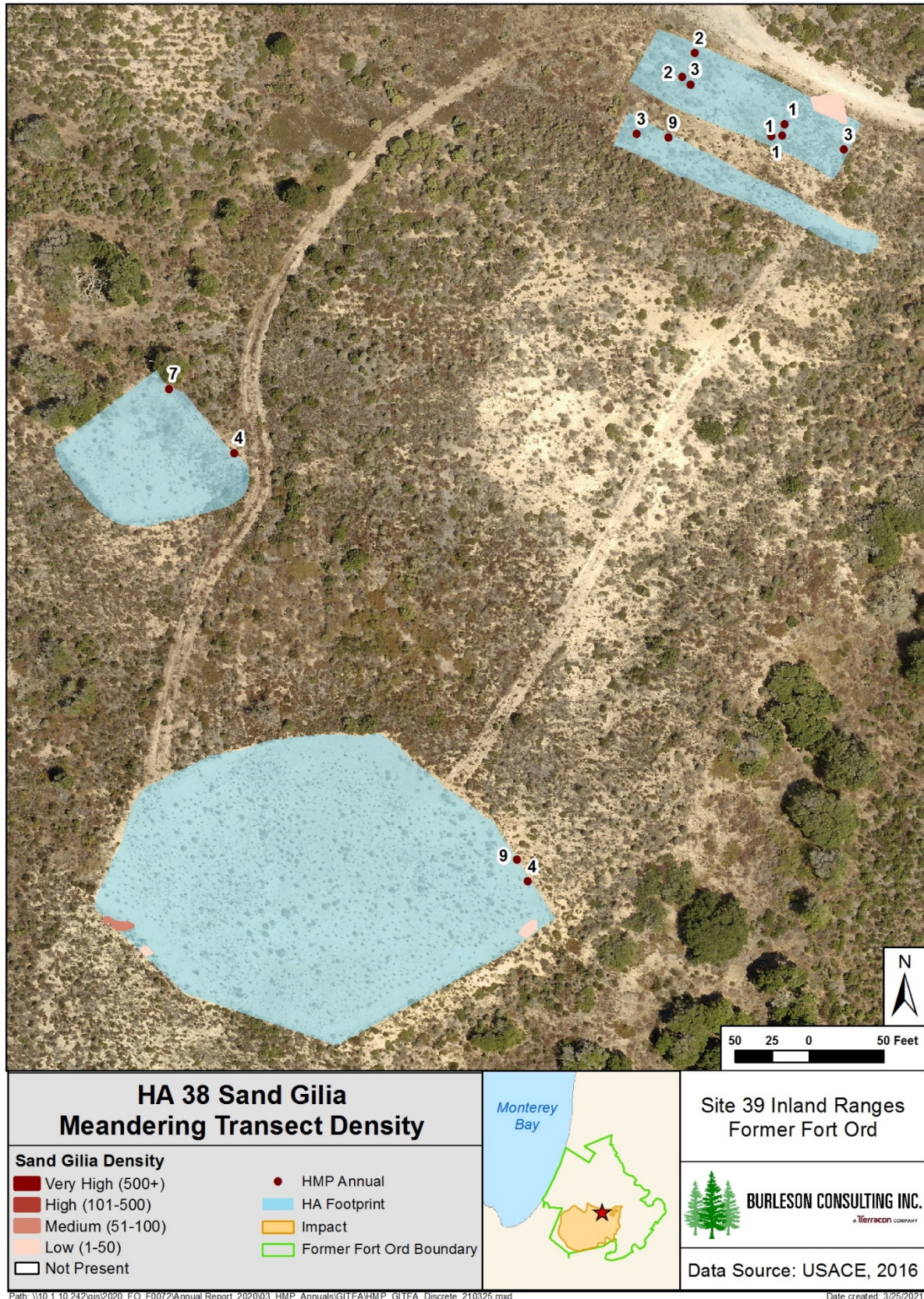


Figure 9-72. HA 38 Sand Gilia Meandering Transect Density Map

9.14.3 Discussion

9.14.3.1 Recommendations

HA 38 was in year 6 of monitoring in 2020; the only monitoring that occurred was photo documentation and HMP annual density surveys. Recommendations were developed from a combination of prior recommendations and the restoration efforts completed in 2020. The site met four out of six success criteria by 2020. Per recommendations in the 2017 Annual Habitat Restoration 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 will also plant Monterey ceanothus in the 2020/2021 season to support the HMP shrub cover by species success criterion. Overall, HA 38 needs time to respond to the restoration effort and continued monitoring to evaluate areas that require additional effort. A qualitative overview was documented by photo points (see Appendix D, page D-15).

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 monitoring year 8, 2022 (see Table 9-115). Table 9-119 summarizes the current status of HA including which success criteria were met and recommendations.

Table 9-119. Status and Recommendations for Achieving Success Criteria at HA 38

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	Yes	None
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	No	Plant Monterey ceanothus (scheduled 2020/2021)*
Objective 3 – No. 4	HMP annual density	No	Wait to see how HA responds

* Recommendation repeated from the 2018 Annual Habitat Restoration Report (Burleson, 2019a).

9.14.3.2 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 3 and year 6 Monterey spineflower restoration plot results show that the density met the success criterion under Objective 3 for four 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 0.1 acre 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 3 sand gilia restoration plot results show that the density met the success criterion under Objective 3 for three out of four plots. In addition, sand gilia was present outside the restoration plots. Discrete patches, with density that met or exceeded the success criterion, covered 0.01 acre of HA 38.

Seaside bird's beak restoration plots had not been established at HA 38 by the time of monitoring and no discrete patches were observed in 2019. The SSRP baseline density class for seaside bird's beak was low. The site did not meet the success criterion for seaside bird's beak.

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 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 restoration procedure 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 began in 2011 and was completed in 2013. Monitoring began in 2013 and additional seed was broadcast in 2020. HA 39/40 was monitored for ten 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 9-120). Figure 9-73 shows the HA footprint, passive restoration area, active restoration area, and transect survey locations. Success criteria for HA 39/40 are summarized in Table 9-121.

Table 9-120. Historic Summary of Restoration and Monitoring Activities at HA 39/40

Activity	Monitoring Years									
			1	2	3	4	5	6	8	13
	2011	2012	2013	2014	2015	2016	2017	2018	2020	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						●	●	●	●	●

* Photo points and site visits occur every year regardless of the monitoring year

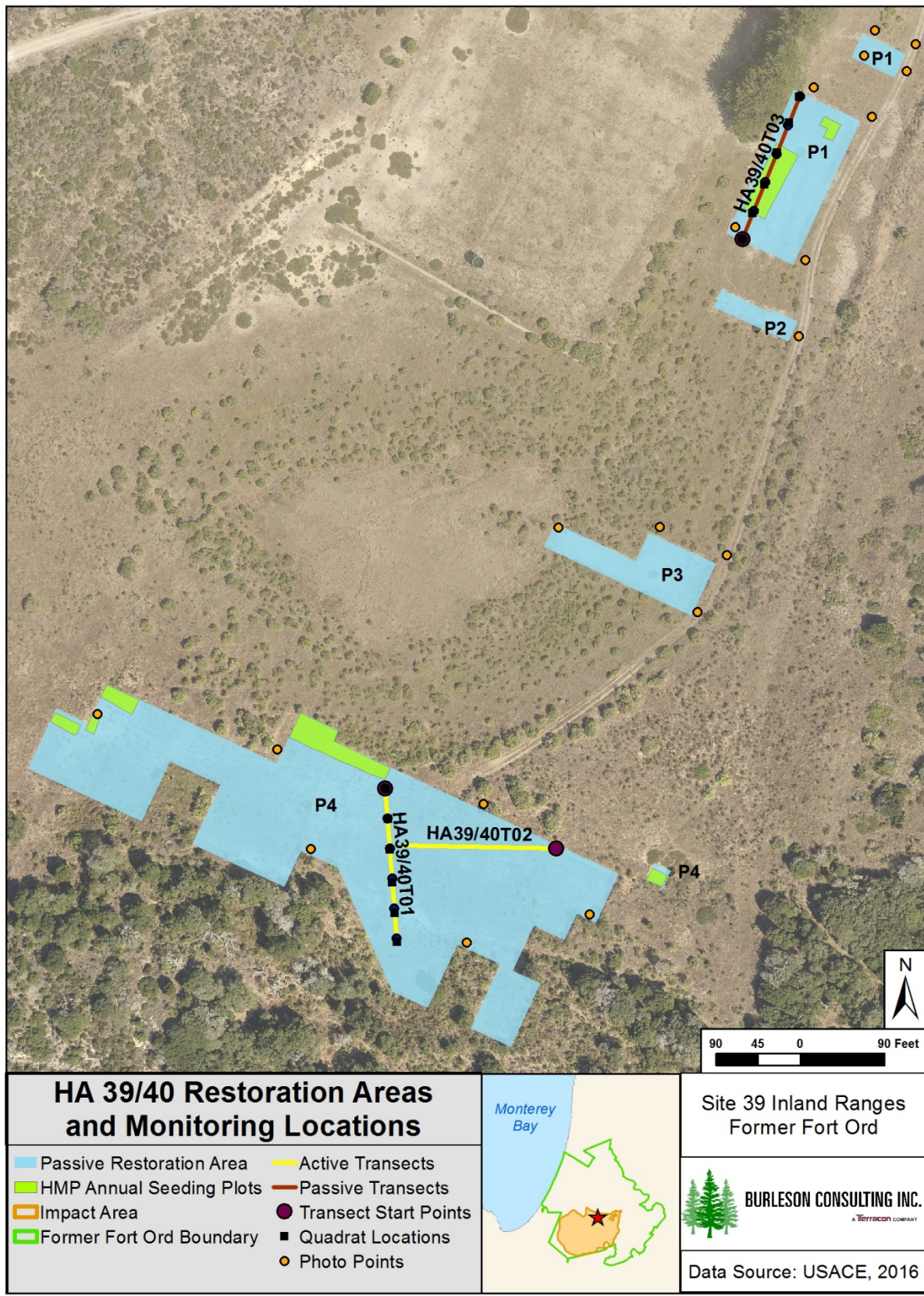


Figure 9-73. HA 39/40 Restoration Areas and Monitoring Locations Map

Table 9-121. 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
		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 9-122 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.

Table 9-122. 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
Carex sp.	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 and 2013. The total number of plants installed at HA 39/40 was 2,818 compared to 2,130 prescribed in the SSRP. Table 9-123 summarizes the plants installed during active restoration.

Table 9-123. Summary of Active Restoration Activities at Plot 4 for HA 39/40

Species	Number of Individual Plants			
	SSRP Target	2012	2013	Total by Species
ACGL	150	150	-	150
ACMI	380	200	-	200
BAPI	75	75	-	75
<i>Carex</i> sp.	-	-	623	623
DIAU	75	75	-	75
DISP	-	-	240	240
ELGL	300	300	-	300
ESCA	250	-	260	260
HOCU	150	150	-	150
LUAL	75	-	75	75
LUAR	75	75	-	75
LUNA	150	-	150	150
STCE	250	285	-	285
STPU	200	160	-	160
TOTAL	2,130	1,470	1,348	2,818

9.15.2 Monitoring Results

9.15.2.1 HMP Annual Density

Monterey spineflower, sand gilia, and seaside bird's beak restoration plots were monitored for density at HA 39/40.

Two Monterey spineflower restoration plots were monitored for year 8 density at HA 39/40 in 2020. The plots are numbered 1 and 2 on Figure 9-75 and are located on the southwestern part of the site.

Monterey spineflower density was low at Plot 1 and high at Plot 2. Figure 9-74 presents Monterey spineflower restoration plot densities for HA 39/40.

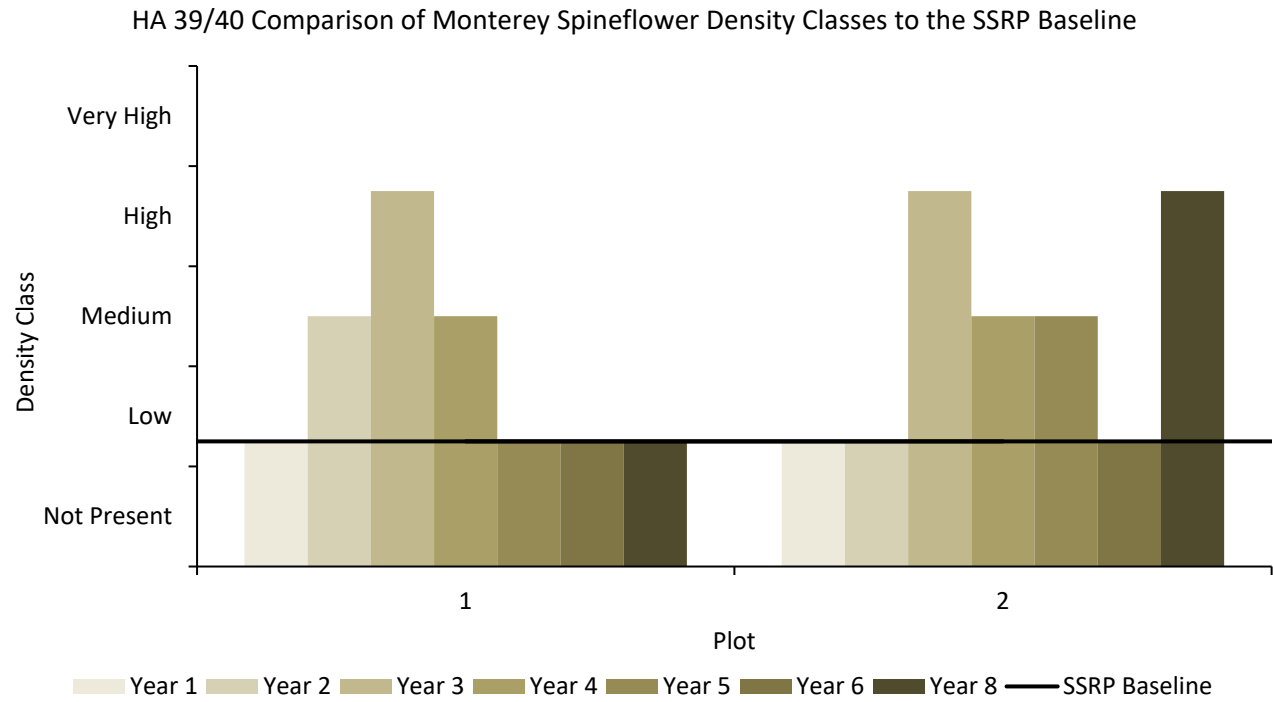


Figure 9-74. HA 39/40 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plots 1 and 2

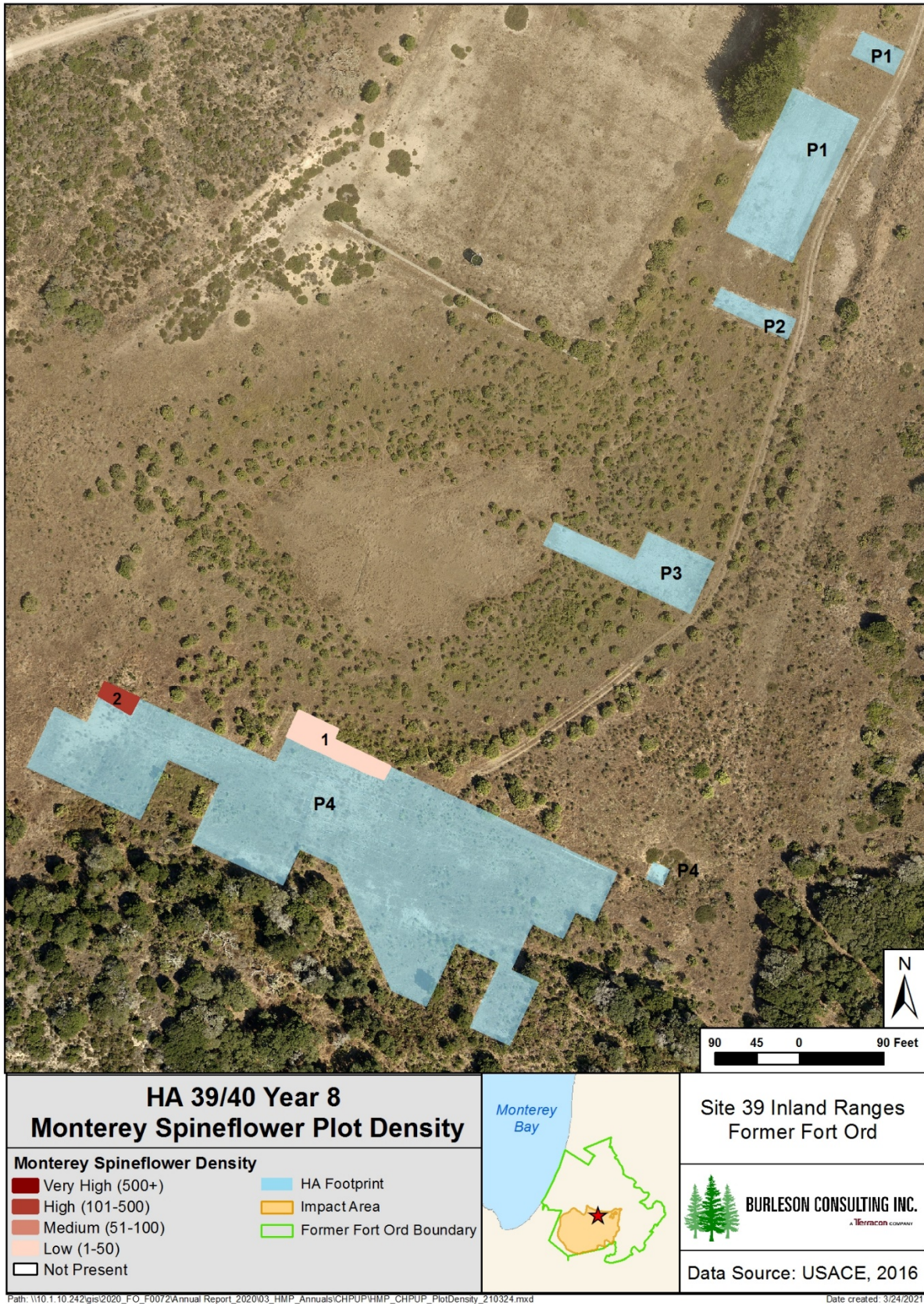
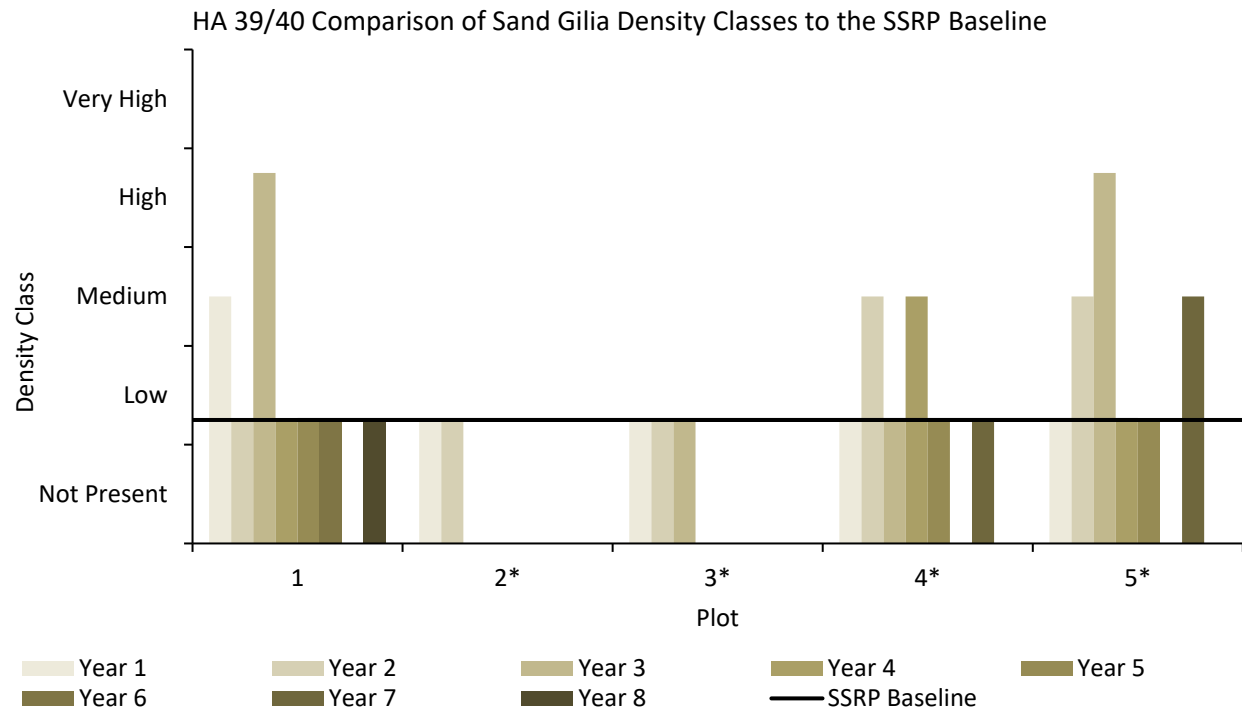


Figure 9-75. HA 39/40 Year 8 Monterey Spineflower Plot Density Map

Five sand gilia plots were surveyed for year 7 (Plots 2-5) and year 8 (Plot 1) density at HA 39/40 in 2020. The plots are numbered 1-5 on Figure 9-77 and are located throughout the site. Sand gilia density was low at Plots 1 and 4, medium at Plot 5, and not present at Plots 2 and 3. Figure 9-76 presents sand gilia restoration plot densities for HA 39/40.



* Plots 2-5 were established in 2014 and have only been monitored for years 1-5 and 7.

Figure 9-76. HA 39/40 Comparison of Sand Gilia Density Classes to the SSRP Baseline for Plots 1-5

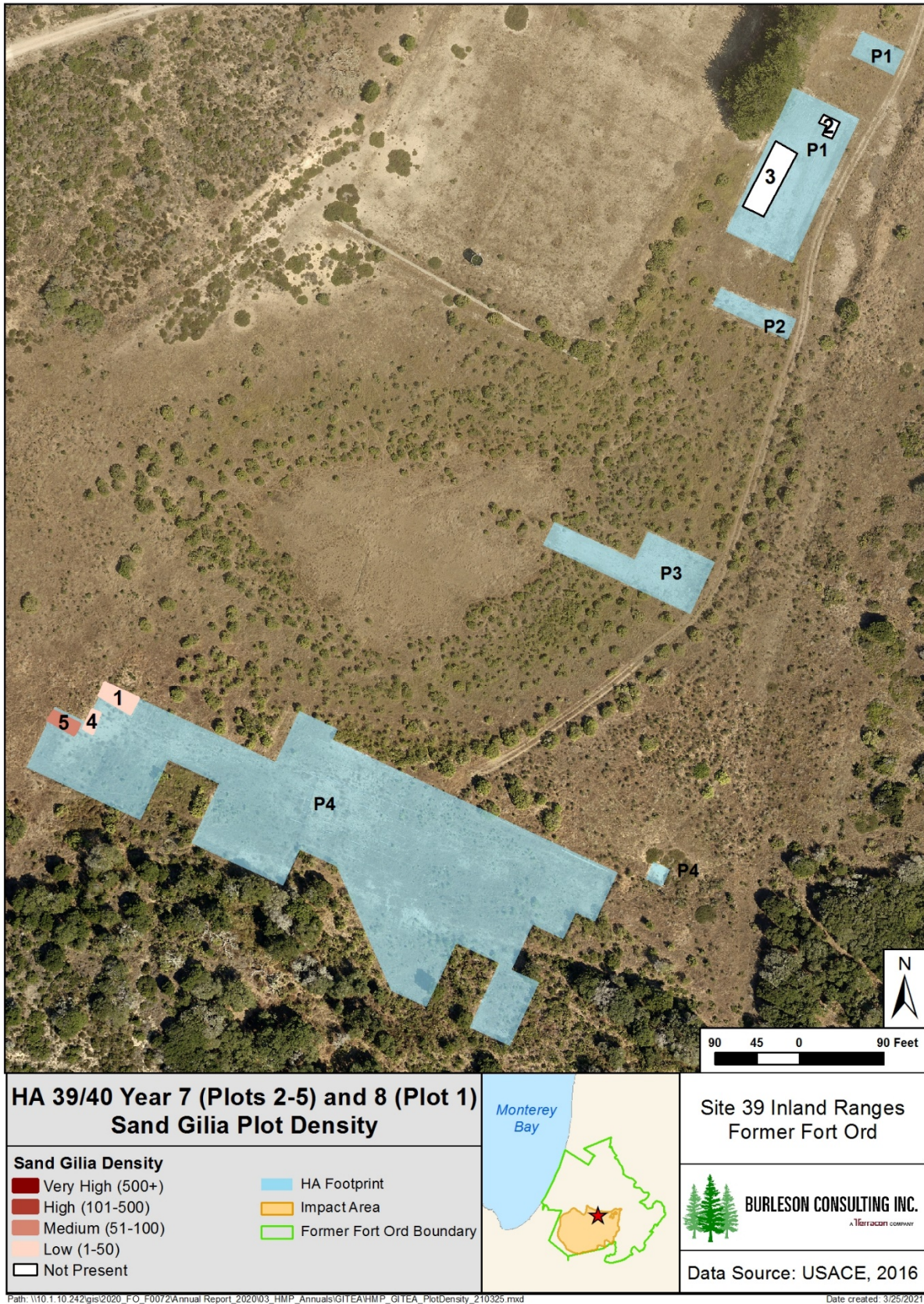


Figure 9-77. HA 39/40 Year 8 Sand Gilia Plot Density Map

One seaside bird's beak plot was surveyed for year 8 density at HA 39/40 in 2020. The plot is numbered 1 on Figure 9-78 and is located on the southeastern part of the site. Seaside bird's beak density was low at Plot 1. Figure 9-79 presents seaside bird's beak restoration plot densities for HA 39/40.

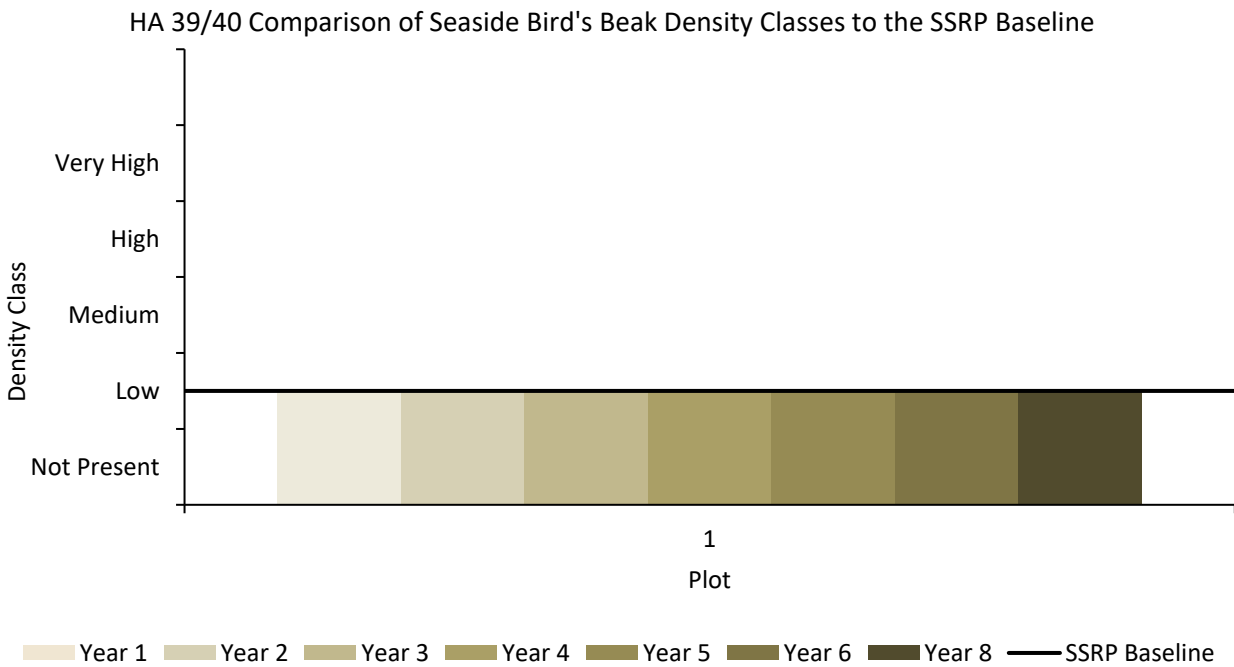


Figure 9-78. HA 39/40 Comparison of Seaside Bird's Beak Density Classes to the SSRP Baseline for Plot 1

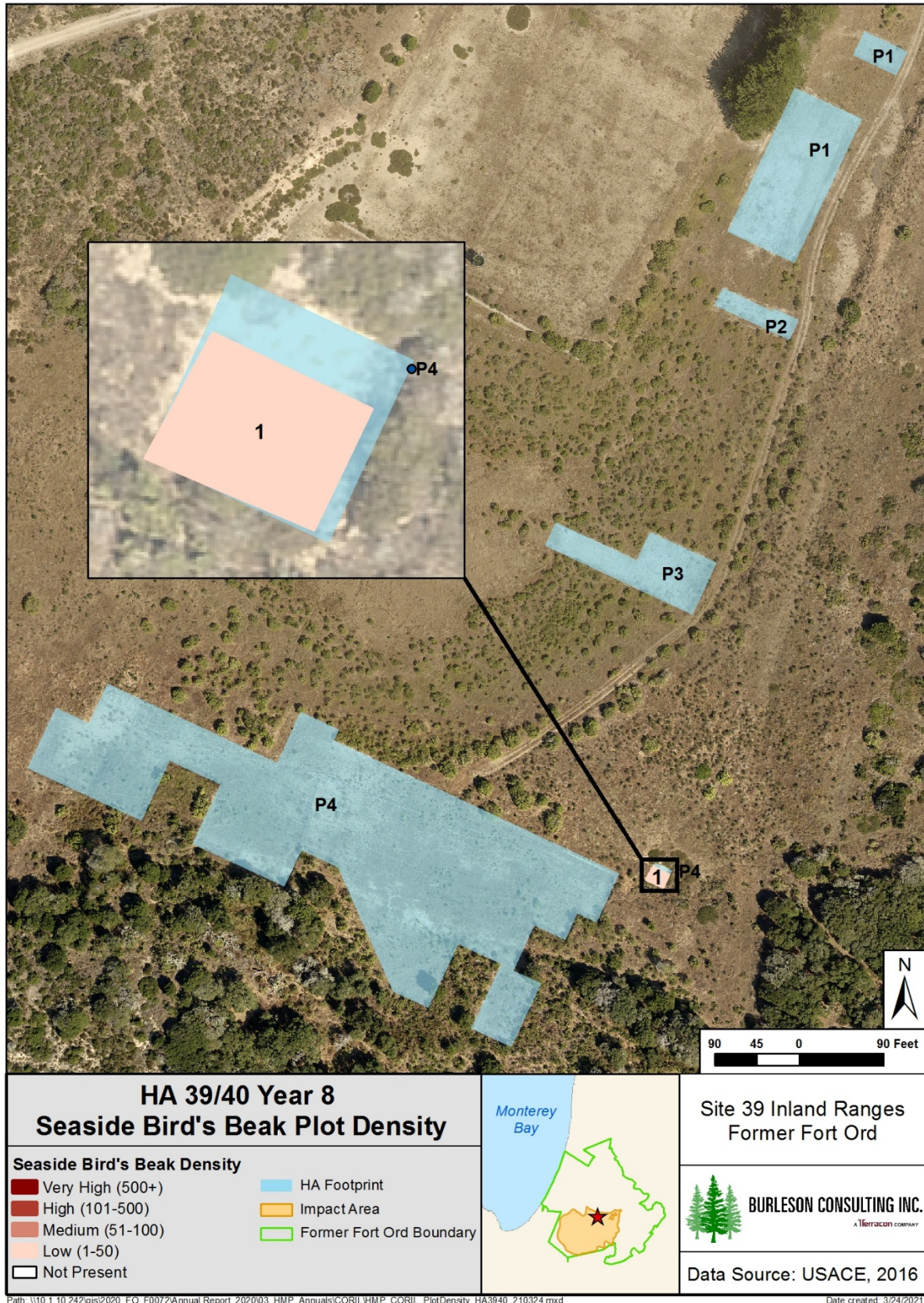


Figure 9-79. HA 39/40 Year 8 Seaside Bird's Beak Plot Density Map

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 Monterey spineflower, sand gilia, and seaside bird's beak at HA 39/40.

Four discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-80). 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 0.03 acre. From 2018 to 2020, the density range remained the same and acreage above the SSRP baseline decreased.

Seven individual plants of sand gilia were counted and mapped at HA 39/40 (see Figure 9-81). Densities and acreages were not calculated because no discrete patches were observed. Sand gilia was not found outside of the restoration plot in 2018.

Seaside bird's beak was not observed at HA 39/40 in 2020 which is consistent with previous monitoring years.

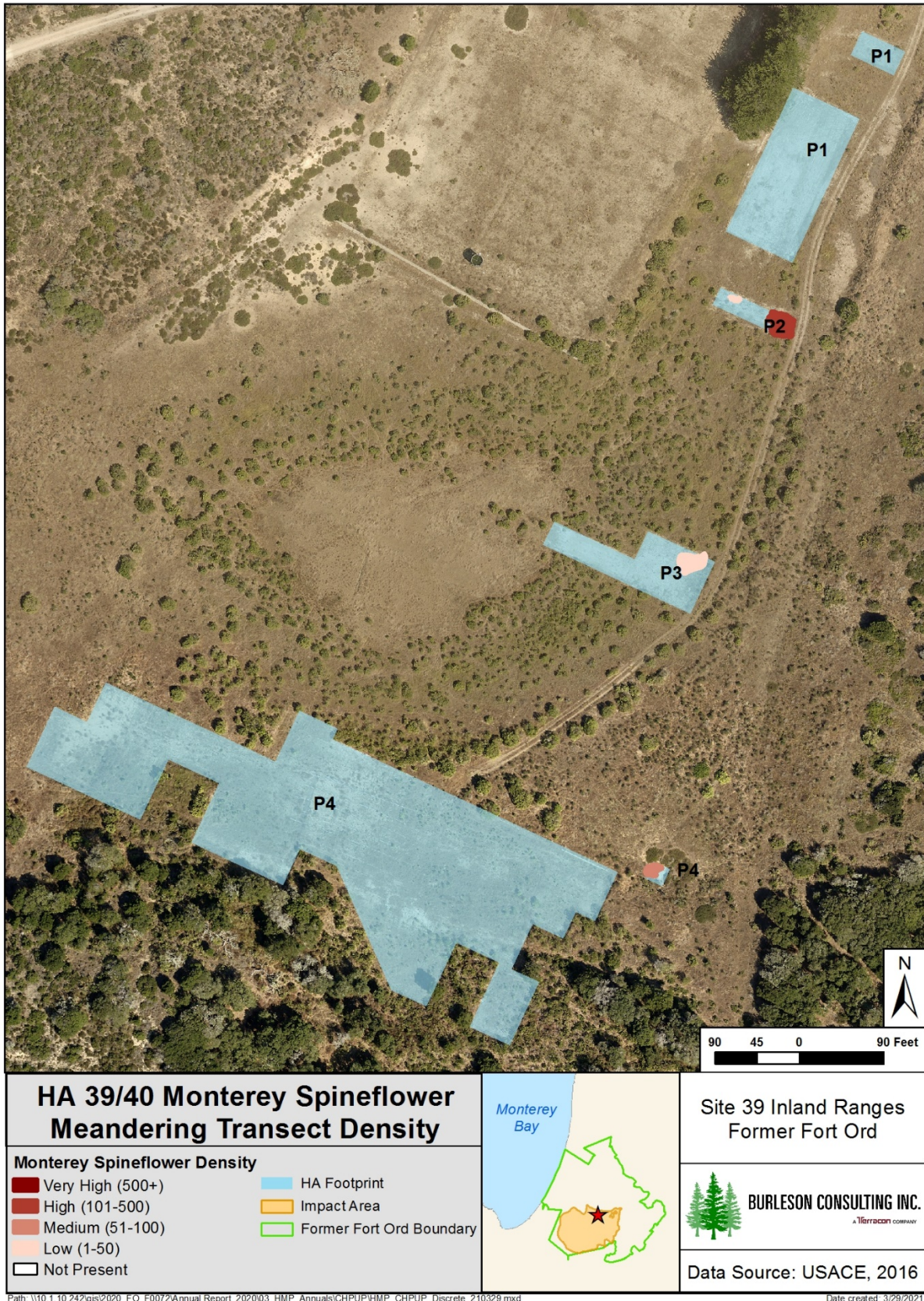


Figure 9-80. HA 39/40 Monterey Spineflower Meandering Transect Density Map

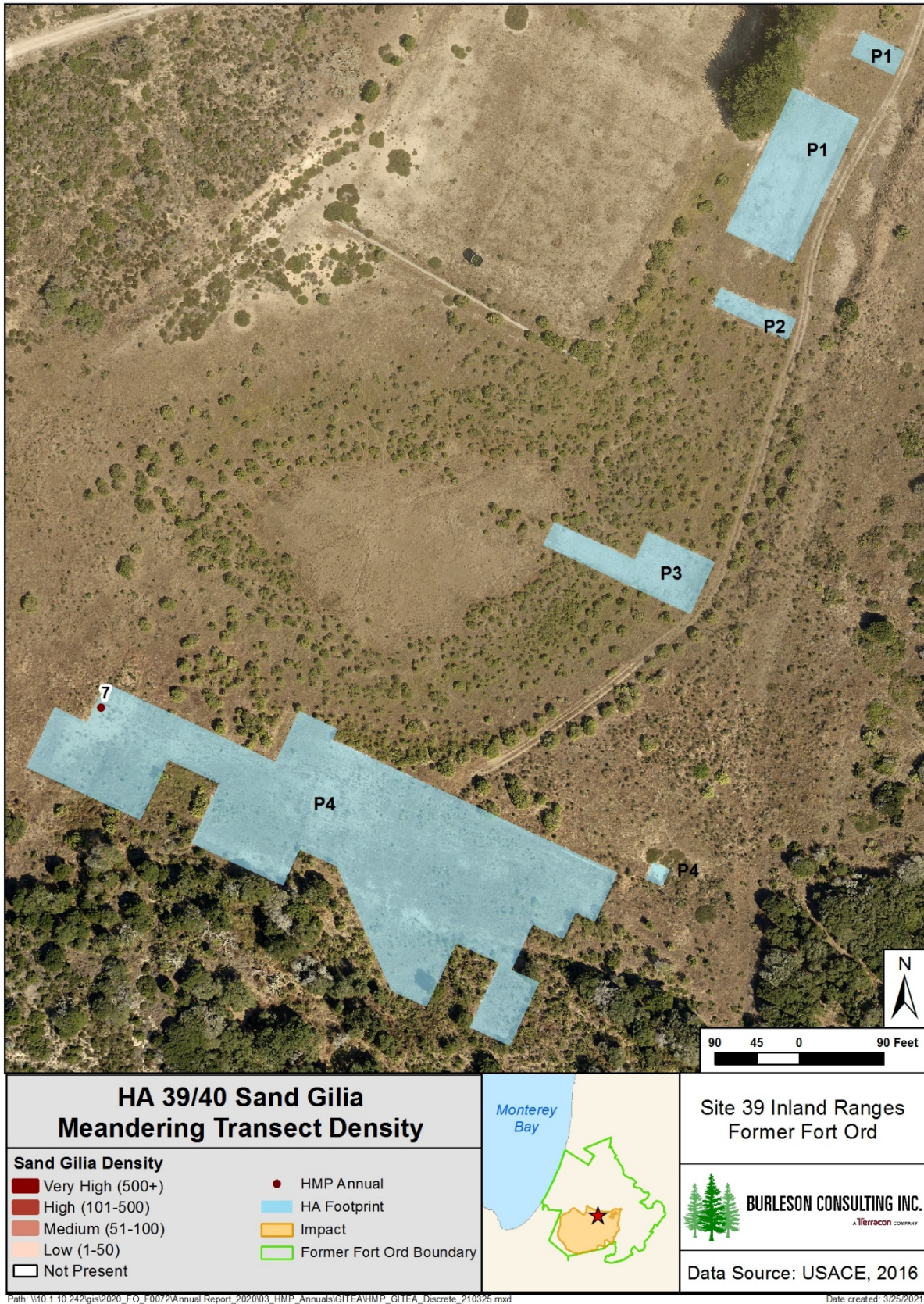


Figure 9-81. HA 39/40 Sand Gilia Meandering Transect Density Map

9.15.2.2 Plant Survivorship

No survivorship data were collected because the planting palette did not include any HMP shrubs.

9.15.2.3 Species Richness

One hundred eleven species were observed at HA 39/40. Of those, 53 were native shrubs or perennials, 24 were native annual herbaceous species, 33 were non-native species, and one was not categorized as it was only identified to genus (see Table 9-124). Species richness decreased by 32 since 2018. Native shrub and perennial species decreased by 16, native herbaceous species decreased by 18, non-native species increased by one, and uncategorized species increased by one.

Table 9-124. Species Observed on HA 39/40, 2020

Scientific Name	Common Name	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon americanus</i> var. <i>americanus</i>	Spanish clover	ACAMA	NF
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Agoseris grandiflora</i>	large-flowered agoseris	AGGR	NP
<i>Agrostis exarata</i>	spike bent grass	AGEX	NP
<i>Aira caryophylla</i>	silver hair grass	AICA	NNF
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Artemisia douglasiana</i>	mugwort	ARDO	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Briza minor</i>	small quaking grass	BRMI	NNF
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Bromus hordeaceus</i>	soft chess	BRHO	NNF
<i>Cardionema ramosissimum</i>	sand mat	CARA	NP
<i>Carex praegracilis</i>	clustered field sedge	CAPR	NP
<i>Castilleja affinis</i>	coast paint-brush	CAAF	NP
<i>Castilleja densiflora</i>	owl's clover	CADE	NF
<i>Cerastium glomeratum</i>	sticky mouse-ear chickweed	CEGL	NNF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Cirsium occidentale</i>	cobwebby thistle	CIOC	NP
<i>Clarkia lewisii</i>	Lewis' clarkia	CLLE	NF
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	winecup clarkia	CLPUQ	NF
<i>Claytonia perfoliata</i>	miner's lettuce	CLPE	NF
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> *	seaside bird's-beak	CORIL	NF
<i>Cortaderia jubata</i>	jubata grass	COJU	NNP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Croton californicus</i>	California croton	CRCA	NP
<i>Cyperus eragrostis</i>	tall cyperus	CYER	NP
<i>Danthonia californica</i>	California oat grass	DACA	NP
<i>Dichelostemma capitatum</i>	blue dicks	DICA	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Distichlis spicata</i>	salt grass	DISP	NP
<i>Eleocharis macrostachya</i>	spike rush	ELMA	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Erigeron canadensis</i>	horseweed	ERCA	NF
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP

Table 9-124. Species Observed on HA 39/40, 2020

Scientific Name	Common Name	Code	Category
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI	NNF
<i>Eschscholzia californica</i>	California poppy	ESCA	NF
<i>Euthamia occidentalis</i>	western goldenrod	EUOC	NP
<i>Festuca bromoides</i>	brome fescue	FEBR	NNF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Festuca perennis</i>	Italian rye grass	FEPE	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Geranium dissectum</i>	cut-leaved geranium	GEDI	NNF
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	GITEA	NF
<i>Heliotropium curassavicum</i> var. <i>oculatum</i>	seaside heliotrope	HECUO	NP
<i>Hesperocyparis macrocarpa</i>	Monterey cypress	HEMA22	NP
<i>Heteromeles arbutifolia</i>	toyon	HEAR	NP
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Juncus balticus</i> ssp. <i>ater</i>	Baltic rush	JUBAA	NP
<i>Juncus bufonius</i> var. <i>bufonius</i>	common toad rush	JUBUB	NF
<i>Juncus occidentalis</i>	western rush	JUOC	NP
<i>Juncus phaeocephalus</i>	brown-headed rush	JUPH	NP
<i>Layia platyglossa</i>	tidy-tips	LAPL	NF
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA	NNF
<i>Lupinus albifrons</i>	silver bush lupine	LUAL	NP
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Lupinus bicolor</i>	miniature lupine	LUBI	NF
<i>Lupinus nanus</i>	sky lupine	LUNA	NF
<i>Luzula comosa</i> var. <i>comosa</i>	Pacific wood rush	LUCOC	NP
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Lythrum hyssopifolia</i>	grass poly	LYHY	NNF
<i>Madia gracilis</i>	slender tarweed	MAGR	NF
<i>Madia sativa</i>	coast tarweed	MASA	NF
<i>Medicago polymorpha</i>	California burclover	MEPO	NNF
<i>Microseris paludosa</i>	Marsh microseris	MIPA	NP
<i>Nuttallanthus texanus</i>	blue toadflax	NUTE	NF
<i>Petrorhagia dubia</i>	hairypink	PEDU	NNF
<i>Plagiobothrys chorisianus</i> var. <i>hickmanii</i>	Hickman's popcornflower	PLCHH	NF
<i>Plantago coronopus</i>	cut-leaved plantain	PLCO	NNF
<i>Plantago lanceolata</i>	English plantain	PLLA	NNF
<i>Platystemon californicus</i>	cream cups	PLCA	NF
<i>Poa pratensis</i>	Kentucky bluegrass	POPR	NNP
<i>Polypogon monspeliensis</i>	rabbitsfoot grass	POMO	NNF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU	NNF
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	western bracken fern	PTAQP	NP

Table 9-124. Species Observed on HA 39/40, 2020

Scientific Name	Common Name	Code	Category
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Ranunculus californicus</i> var. <i>californicus</i>	common buttercup	RACAC	NP
<i>Ribes speciosum</i>	fuchsia-flowered gooseberry	RISP	NP
<i>Rubus ursinus</i>	California blackberry	RUUR	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Rumex crassus</i>	willow leaved dock	RUCR4	NP
<i>Rumex salicifolius</i>	willow leaved dock	RUSA	NP
<i>Salix</i> sp.	willow	SA	NP
<i>Senecio glomeratus</i>	cutleaf burnweed	SEGL	NNF
<i>Silene gallica</i>	small-flower catchfly	SIGA	NNF
<i>Sisyrinchium bellum</i>	western blue-eyed grass	SIBE	NP
<i>Solanum umbelliferum</i>	blue witch	SOUM	NP
<i>Stachys bullata</i>	wood mint	STBU	NP
<i>Stipa pulchra</i>	purple needle grass	STPU	NP
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP
<i>Trifolium angustifolium</i>	narrow-leaved clover	TRAN	NNF
<i>Trifolium campestre</i>	hop clover	TRCA	NNF
<i>Trifolium dubium</i>	little hop clover	TRDU	NNF
<i>Trifolium gracilentum</i>	pinpoint clover	TRGR	NF
<i>Trifolium hirtum</i>	rose clover	TRHI	NNF
<i>Trifolium microcephalum</i>	small-head clover	TRMI	NF
<i>Vicia americana</i> ssp. <i>americana</i>	American vetch	VIAMA	NP
<i>Vicia sativa</i> ssp. <i>nigra</i>	narrow-leaved vetch	VISAN	NNF
<i>Vicia</i> sp.	vetch	VI	
<i>Zeltnera davyi</i>	Davy's centaury	ZEDA	NF

* HMP species

9.15.2.4 Vegetative Cover

Three 50-meter line-intercept transects and six associated quadrats were conducted at HA 39/40. These surveys indicated that the mean vegetative cover by native shrubs and perennials was 19.91%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2018 by 2.64%. Quadrats were completed along the transect line when 10% or more of the transect line was herbaceous cover, in accordance with the *Protocol for Conducting Vegetation Monitoring* (Burleson, 2009). Quadrats were completed for two transects (T01 and T03) at HA 39/40. Table 9-125 summarizes vegetative cover and Table 9-126 presents vegetative cover by species. Figure 9-82 presents the percent cover of dominant species at HA 39/40 in 2016, 2017, 2018, and 2020 and Table 9-127 presents quadrat results.

Table 9-125. Transect Survey Summary for HA 39/40

Transect	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA39/40T01	30.62	21.88	8.74	100.00	0.00
HA39/40T02	34.78	34.58	0.20	100.00	0.00
HA39/40T03	15.70	3.28	12.16	94.64	5.36
SITE AVERAGE	27.03	19.91	7.03	98.21	1.79

Table 9-126. Transect Survey Results for HA 39/40 by Species

Transect	ACGL (%)	AICA (%)	BAPI (%)	BRDI (%)	CARA (%)	ELGL (%)	HEGR (%)	HOCU (%)	HYRA (%)	LUAR (%)	LUNA (%)
HA39/40T01	0.38	7.22	7.22	0.00	0.00	2.58	0.00	5.30	0.00	0.22	1.64
HA39/40T02	0.00	0.00	17.68	0.00	0.00	1.32	0.00	3.40	0.20	0.00	3.92
HA39/40T03	0.00	8.02	0.00	0.24	0.20	0.00	1.34	1.74	0.00	0.00	0.00
SITE AVERAGE	0.13	5.08	8.30	0.08	0.07	1.30	0.45	3.48	0.07	0.07	1.85

Table 9-126 (continued). Transect Survey Results for HA 39/40 by Species

Transect	MASA (%)	PLCO (%)	RUAC (%)	STBU (%)	STPU (%)	TODI (%)	TRDU (%)	VI (%)	TH (%)	BG (%)
HA39/40T01	0.96	1.30	0.22	0.26	1.10	2.22	0.00	0.00	100.00	0.00
HA39/40T02	0.00	0.00	0.00	0.00	4.80	3.46	0.00	0.00	100.00	0.00
HA39/40T03	0.00	1.30	0.00	0.00	0.00	0.00	2.60	0.26	94.64	5.36
SITE AVERAGE	0.32	0.87	0.07	0.09	1.97	1.89	0.87	0.09	98.21	1.79

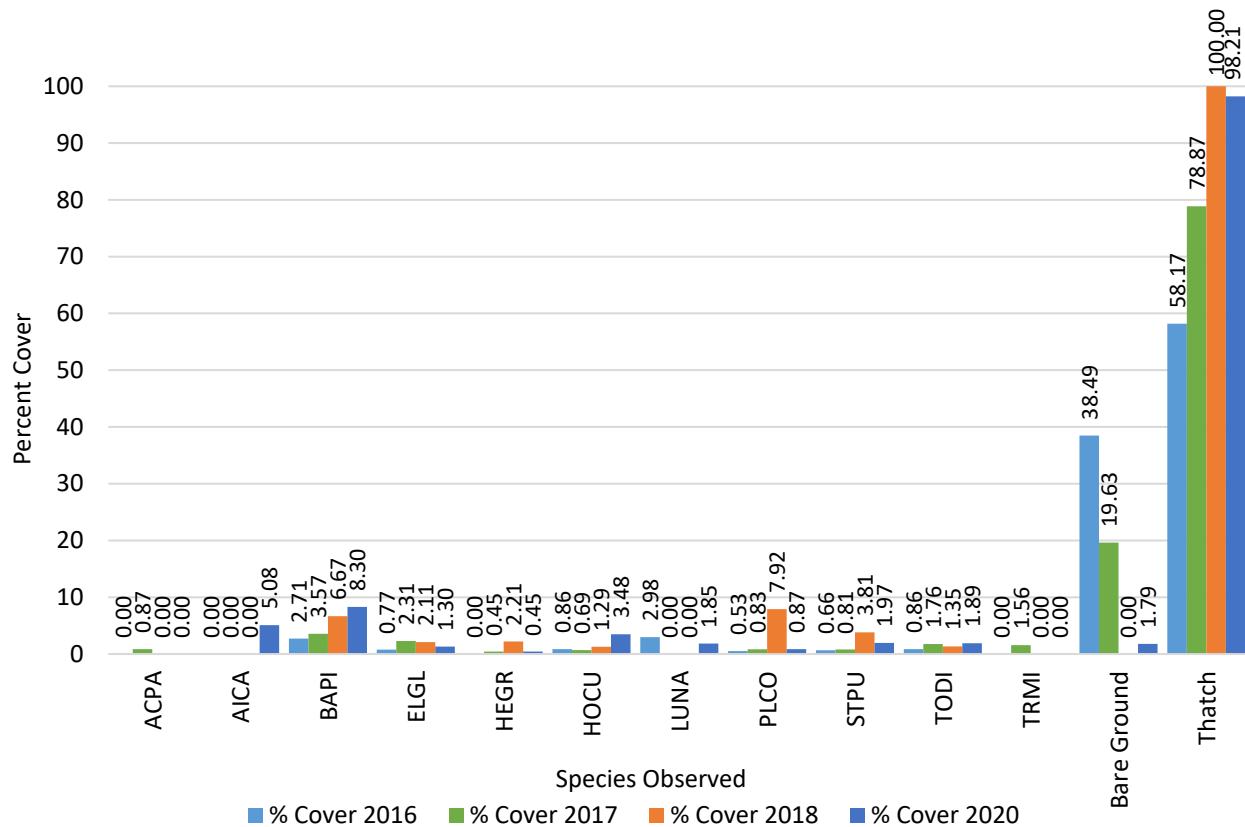
**Figure 9-82. Percent Cover of Dominant Species at HA 39/40 in 2016, 2017, 2018, and 2020.**

Table 9-127. Quadrat Summary for HA 39/40 Transects T01 and T03

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA39/40T01Q01	59	32	1	26	20	21
HA39/40T01Q02	81	44	0	36	17	2
HA39/40T01Q03	53	35	0	18	40	7
HA39/40T01Q04	65	29	4	32	20	15
HA39/40T01Q05	29	6	8	15	21	50
HA39/40T01Q06	61	31	6	24	14	25
HA39/40T03Q01	27	3	12	12	50	23
HA39/40T03Q02	46	0	6	40	25	29
HA39/40T03Q03	20	0	6	14	30	50
HA39/40T03Q04	28	0	11	17	35	37
HA39/40T03Q05	31	0	10	21	59	10
HA39/40T03Q06	60	5	13	42	25	15
SITE AVERAGE	47	15	6	25	30	24

9.15.3 Discussion

9.15.3.1 Recommendations

HA 39/40 was in year 8 of monitoring in 2020. The site met three out of four success criteria by 2020. Per recommendations in the 2017 Habitat Restoration Annual Report, production seed mix was broadcast in Plots 1 and 2. Additional corrective measures are scheduled for the 2020/2021 season: 1) plant coyote brush and yellow bush lupine in Plots 1 and 2, and 2) plant *Juncus* sp., clustered field sedge, and saltgrass 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 another plot to better assess the restoration progress at the site. Based on qualitative evaluation, Plots 1 and 2 are similar and could be evaluated together since Plot 1 already has a transect and Plot 2 is relatively small. The Army will add a transect to Plot 3. Overall, HA 39/40 needs time to respond to the restoration effort. A qualitative overview was documented by photo points (see Appendix D, page D-16 and Appendix F, page F-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 9-120). Reevaluation of the success criteria may be considered at that time. Table 9-128 summarizes the current status of HA 39/40 including which success criteria were met and recommendations.

Table 9-128. Status and Recommendations for Achieving Success Criteria at HA 39/40

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Plant coyote brush and yellow bush lupine in Plots 1 and 2; plant <i>Juncus</i> sp., clustered field sedge, and saltgrass in Plot 3 (scheduled 2020/2021)* Add transect in Plot 3†
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	NA	NA
Objective 3 – No. 4	HMP shrub cover by species	NA	NA
Objective 3 – No. 4	HMP annual density	Yes	None

* Recommendation repeated from the 2017 Annual Habitat Restoration Report (Burlison, 2018).

† Not scheduled

9.15.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 39/40. The SSRP baseline density class for Monterey spineflower was low. Year 8 Monterey spineflower restoration plot results show that the density met or exceeded the success criterion under Objective 3 for all plots. In addition, Monterey spineflower was present outside the restoration plots. Discrete patches, with density that met or exceeded the success criterion, covered 0.03 acres of HA 39/40. This concludes HMP annual monitoring for Monterey spineflower at HA 39/40, the success criterion has been met.

Sand gilia density was within the acceptable limit for HMP annual density at HA 39/40. The SSRP baseline density class for sand gilia was low. Year 7 and year 8 sand gilia restoration plot results show that the density met or exceeded the success criterion under Objective 3 for three out of five plots. In addition, sand gilia was present outside the restoration plot. The density was not calculated because only individuals were observed. Sand gilia will be monitored for one more year to complete eight years of monitoring at HA 39/40 for all plots.

Seaside bird's beak density was within the acceptable limit for HMP annual density at HA 39/40. The SSRP baseline density class for seaside bird's beak was low. Year 8 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. This concludes HMP annual monitoring for seaside bird's beak at HA 39/40, the success criterion has been met.

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

9.15.3.3 Plant Survivorship

No survivorship data were collected because the planting palette did not include HMP shrubs.

9.15.3.4 Species Richness

Common yarrow, coyote brush, sedge (*Carex* sp.), blue wild-rye, California poppy (*Eschscholzia californica*), wedge leaved horkelia, yellow bush lupine, silver bush lupine, saltgrass (*Distichlis spicata*),

deerweed, sticky monkeyflower, and rush (*Juncus* sp.) were present. HA 39/40 included 53 native shrubs and perennials and met the success criterion for Objective 1.

9.15.3.5 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 20 shrub and perennial species presented in Table 2 of the HA 39/40 SSRP (Burleson, 2013). Currently the HA includes 17.10% native vegetative cover; therefore, this success criterion was not met (see Figure 9-83).

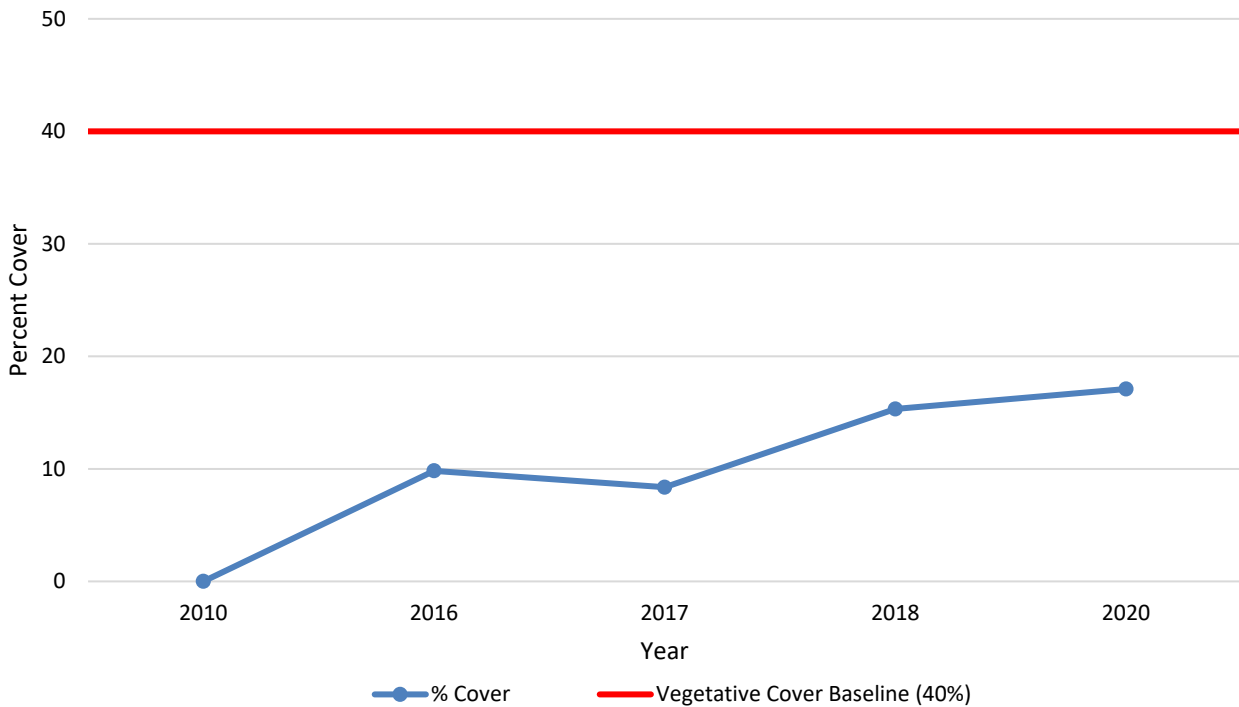


Figure 9-83. Native Vegetative Cover Compared to the Success Criterion at HA 39/40

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 1. Cover class 1 is 0% of absolute cover. The HMP shrub species at HA 39/40 provided an absolute cover of 0.00%. The HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 39/40, baseline data indicated no HMP shrubs. Therefore, no HMP shrubs need to be present at this restoration site and this success criterion is not applicable.

9.16 HA 43

HA 43 was used by the Army as a long-distance small-arms firing range. Munitions removal and soil remediation was completed in 2010; 150 cubic yards of lead-contaminated soil were excavated from 0.09 acre. 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, and 2020. Monitoring began in 2013. HA 43 was monitored for ten years by photo documentation and site visits, seven years for HMP annual density in plots, four years for HMP annual density across the HA, and five years for species richness and vegetative cover (see Table 9-129). Figure 9-84 shows the HA footprint, passive restoration area, and transect monitoring locations. Success criteria for HA 43 are summarized in Table 9-130.

Table 9-129. Historic Summary of Restoration and Monitoring Activities at HA 43

Activity	Monitoring Years										
			1	2	3	4	5	6	7	8	13
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	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						●†	●	●	●	●	●

* Photo points and site visits occur every year regardless of the monitoring year

† Vegetative cover was monitored using quadrats in 2016

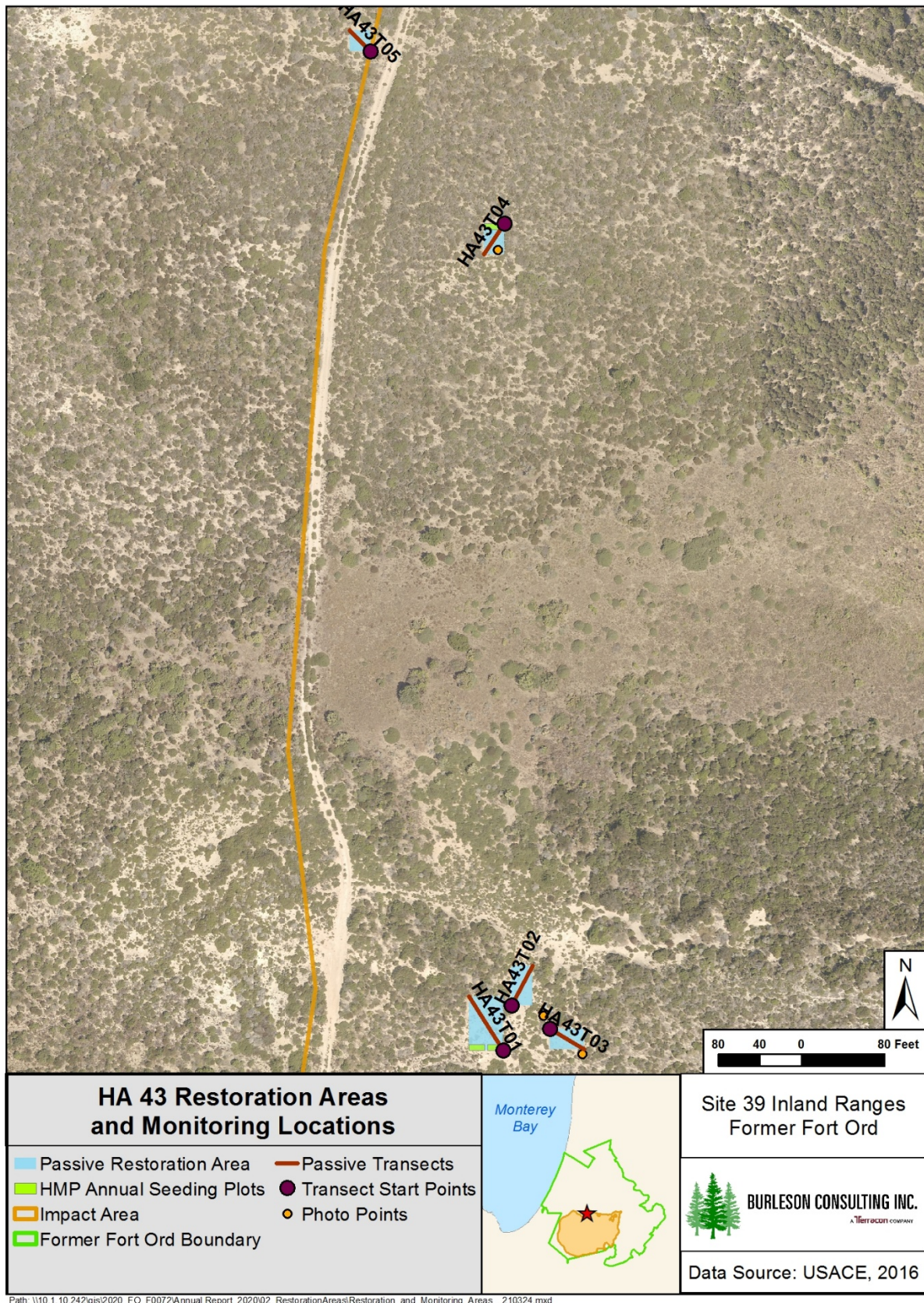


Figure 9-84. HA 43 Restoration Areas and Monitoring Locations Map

Table 9-130. 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
		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 9-130. 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 for erosion control activities and adaptive management. Table 9-131 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.

Table 9-131. 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, an AMP planting event occurred in 2019 per recommendations made in the 2018 Annual Report (Burleson, 2019a). A total of 44 plants were installed at HA 43. Table 9-132 summarizes the plants installed during active restoration.

Table 9-132. Summary of Active Restoration Activities for HA 43

Species	Number of Individual Plants	
	2019	Total by Species
ADFA	10	10
CERI*	20	20
DIAU	14	14
TOTAL	44	44

*HMP species

9.16.2 Monitoring Results

9.16.2.1 HMP Annual Density

Monterey spineflower, sand gilia, and seaside bird's beak restoration plots were monitored for density at HA 43.

One Monterey spineflower plot was surveyed for year 8 density at HA 43 in 2020. The plot is numbered 1 on Figure 9-86 and located in the southern part of the site. Monterey spineflower density was low in Plot 1. Figure 9-85 presents Monterey spineflower restoration plot densities for HA 43.

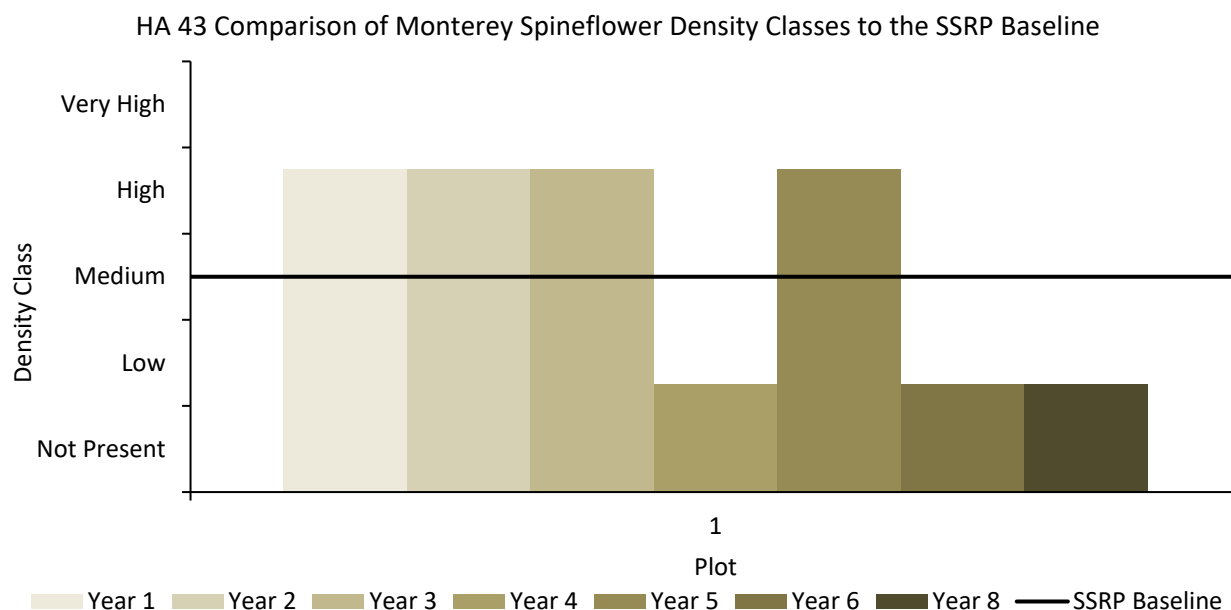


Figure 9-85. HA 43 Comparison of Monterey Spineflower Density Classes to the SSRP Baseline for Plot 1

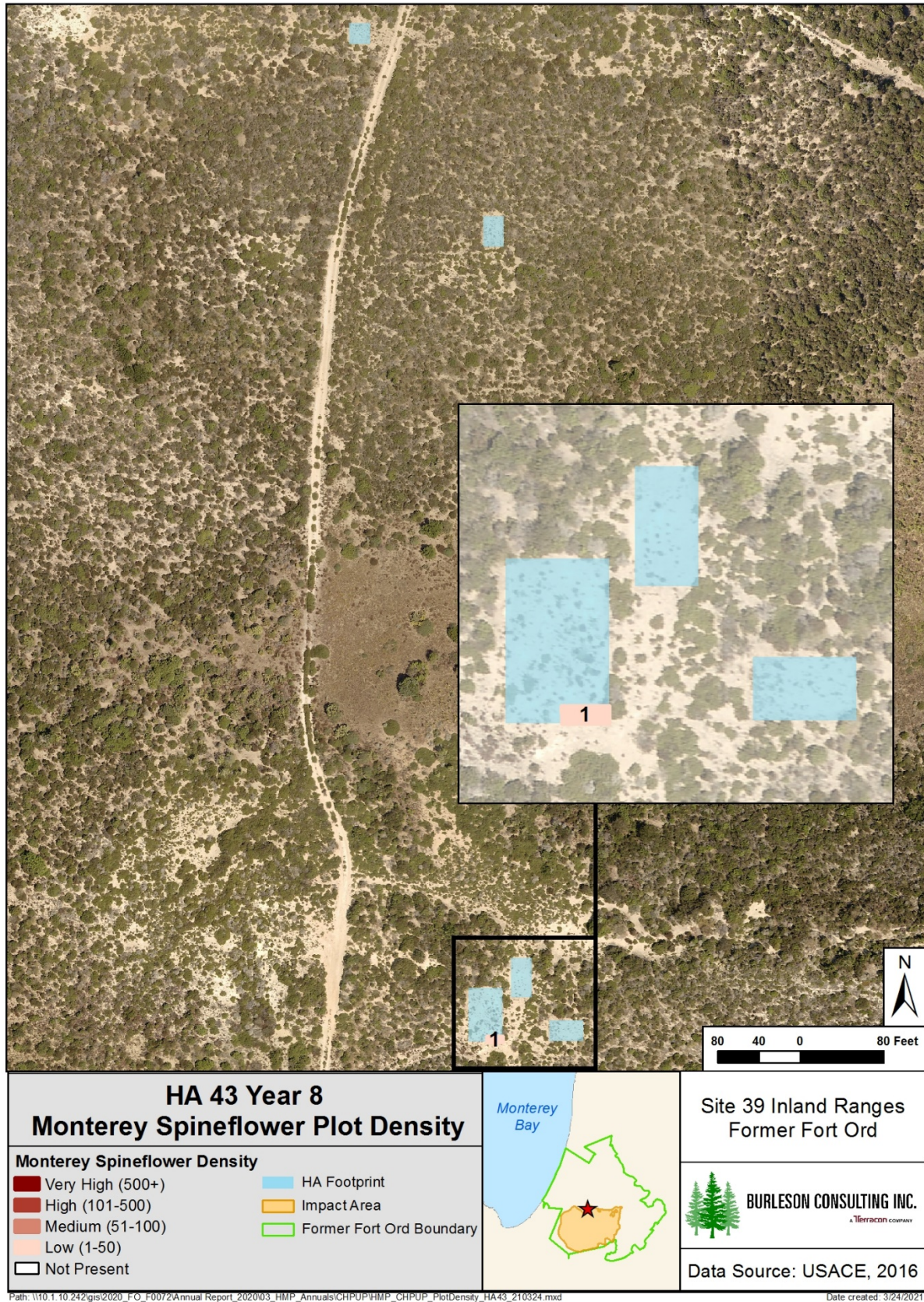


Figure 9-86. HA 43 Year 8 Monterey Spineflower Plot Density Map

One sand gilia plot was surveyed for year 8 density at HA 43 in 2020. The plot is numbered 1 on Figure 9-88 and located in the southern part of the site. Sand gilia was not present in Plot 1. Figure 9-87 presents sand gilia restoration plot densities for HA 43.

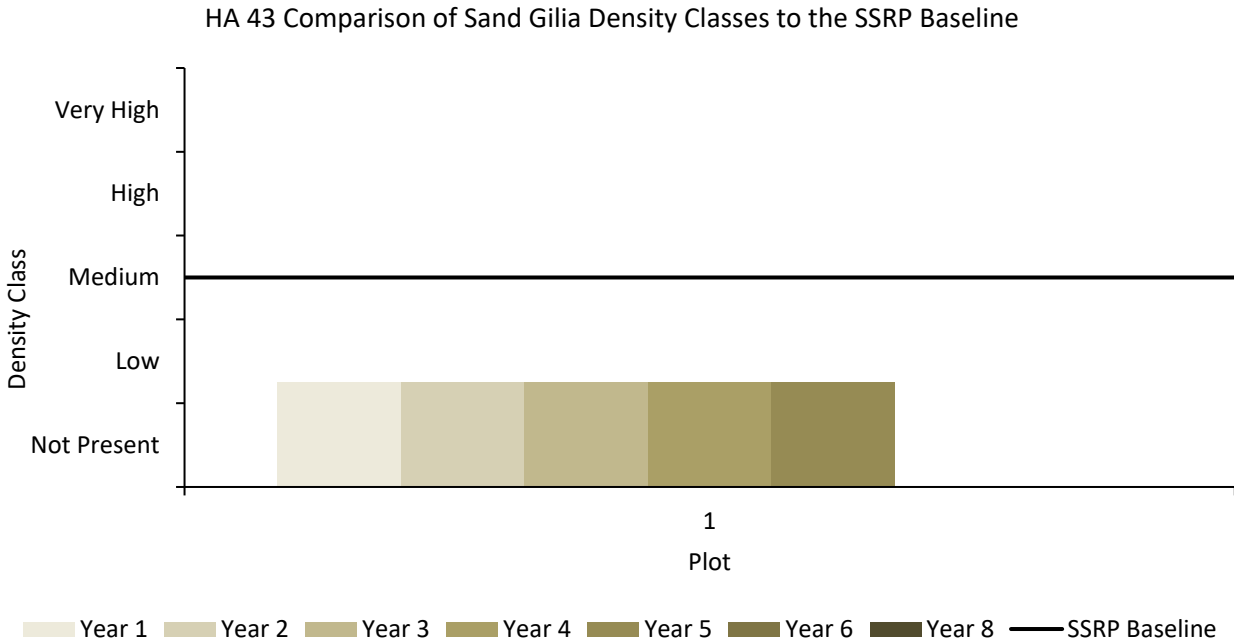
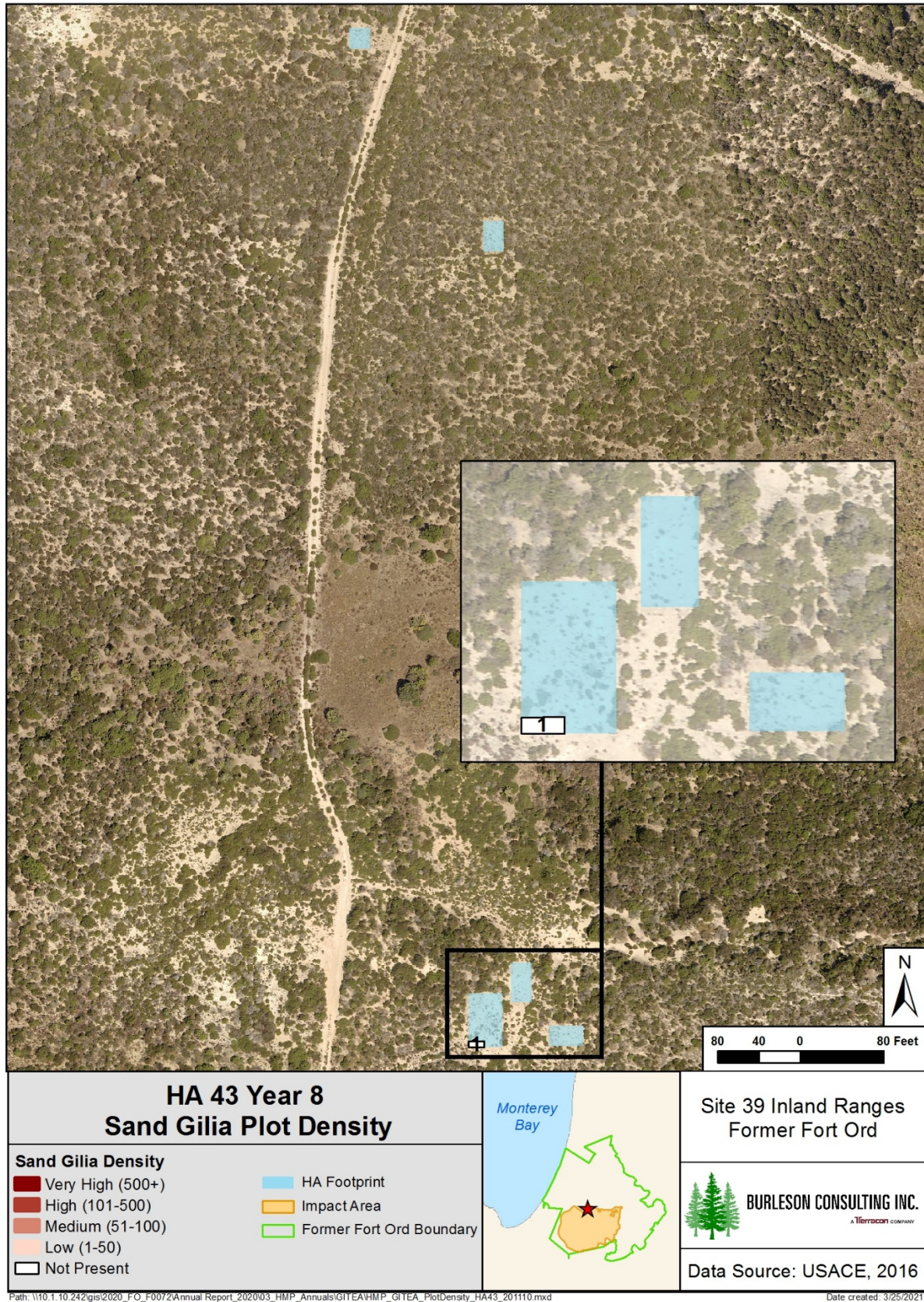


Figure 9-87. HA 43 Comparison of Sand Gilia Density Classes to the SSRP Baseline for Plot 1

**Figure 9-88. HA 43 Year 8 Sand Gilia Plot Density Map**

One seaside bird's beak plot was surveyed for year 8 density at HA 43 in 2020. The plot is numbered 1 on Figure 9-90 and is located in the northern part of the site. Seaside bird's beak density was low in Plot 1. Figure 9-89 presents seaside bird's beak restoration plot densities for HA 43.

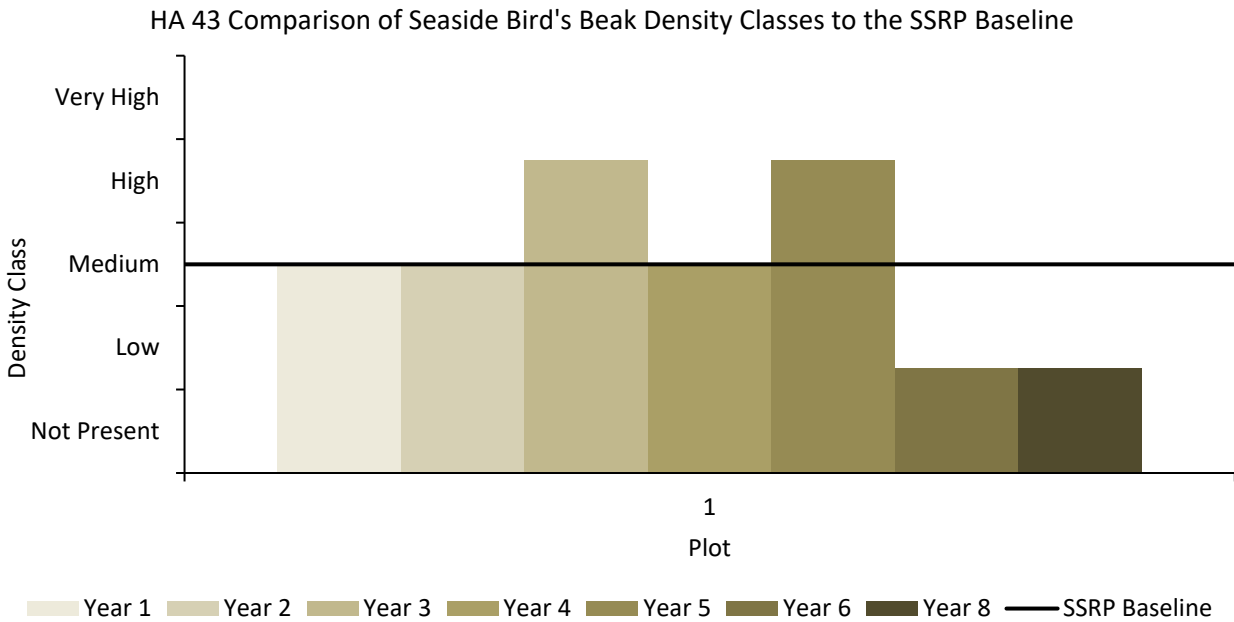


Figure 9-89. HA 43 Comparison of Seaside Bird's Beak Density Classes to the SSRP Baseline for Plot 1

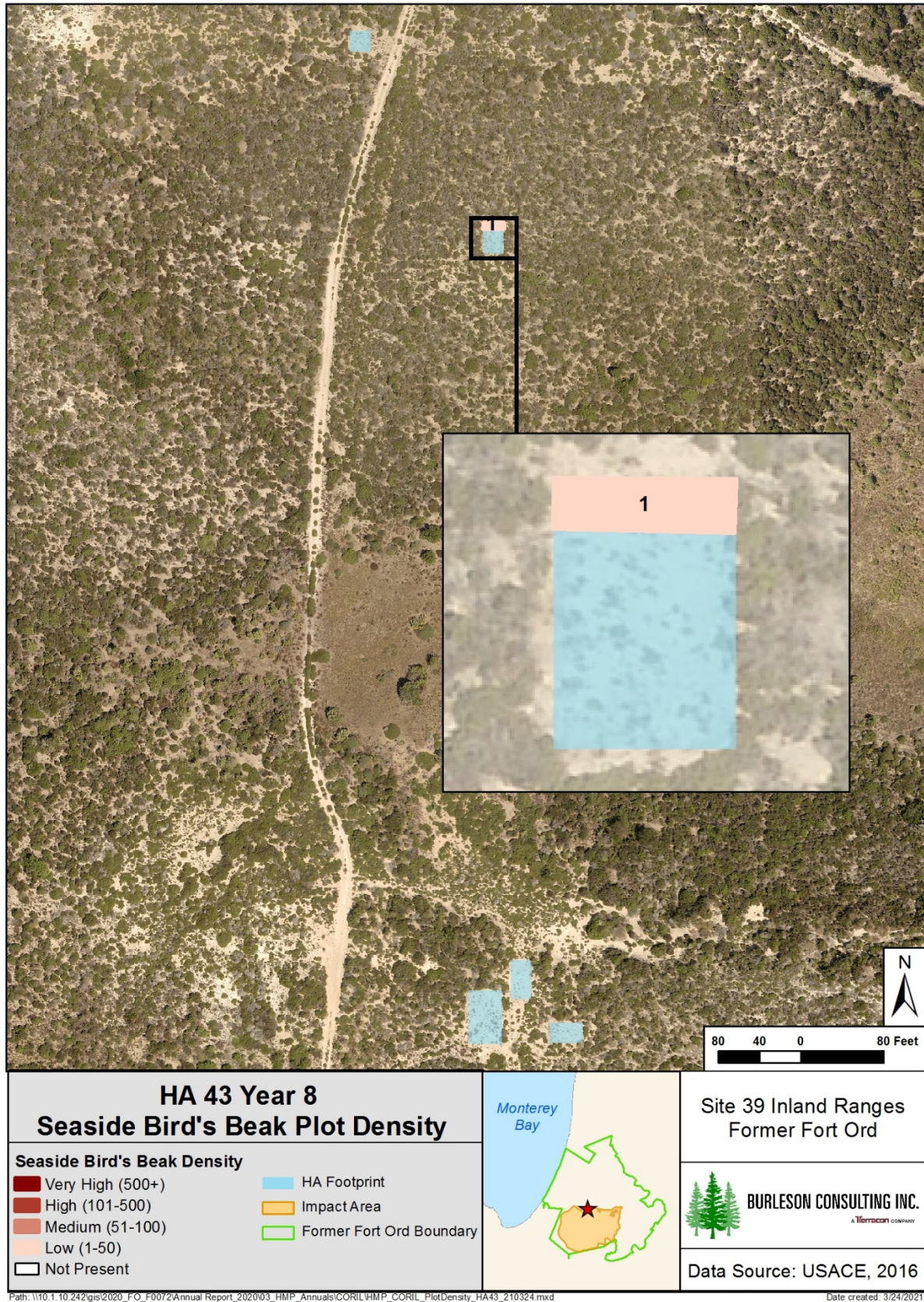


Figure 9-90. HA 43 Year 8 Seaside Bird's Beak Plot Density Map

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 Monterey spineflower, sand gilia, and seaside bird's beak at HA 43.

Seven individual plants and five discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-91). 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 medium was 0.01 acres. Total acreage of Monterey spineflower patches within HA 43 was also 0.01 acre. From 2018 to 2020, the density range increased and acreage above the SSRP baseline remained the same.

Sand gilia was not observed outside the restoration plots in 2020 which is consistent with monitoring results in 2018.

Four individual plants and four discrete patches of seaside bird's beak were mapped and individuals counted within the patch (see Figure 9-92). Densities ranged from low to medium and the total acreage of seaside bird's beak patches with a density at or above the SSRP baseline density class of medium was 0.002 acre. Total acreage of seaside bird's beak patches within HA 43 was 0.008 acre. From 2018 to 2020, the density range and acreage above the SSRP baseline increased.

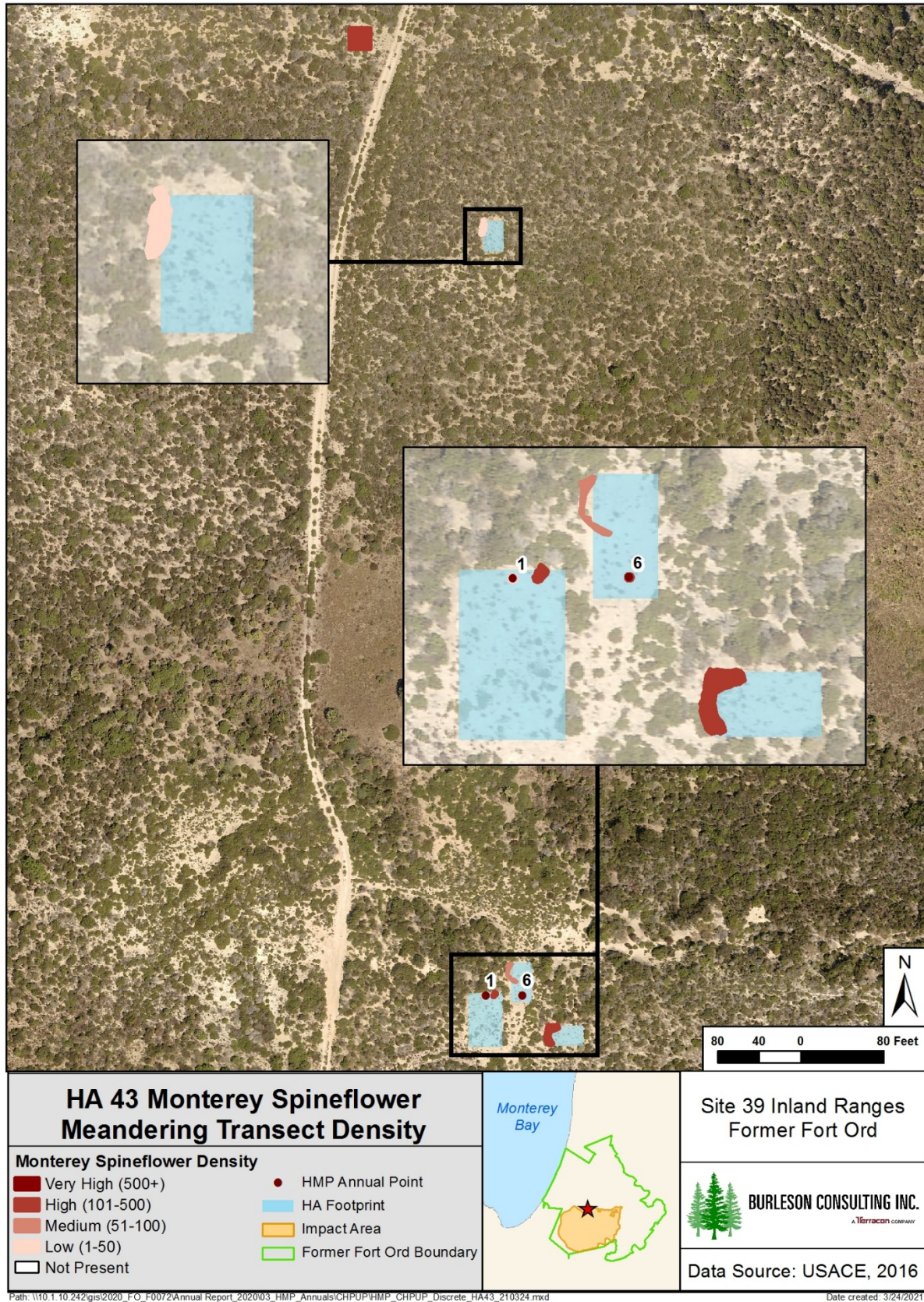


Figure 9-91. HA 43 Monterey Spineflower Meandering Transect Density Map

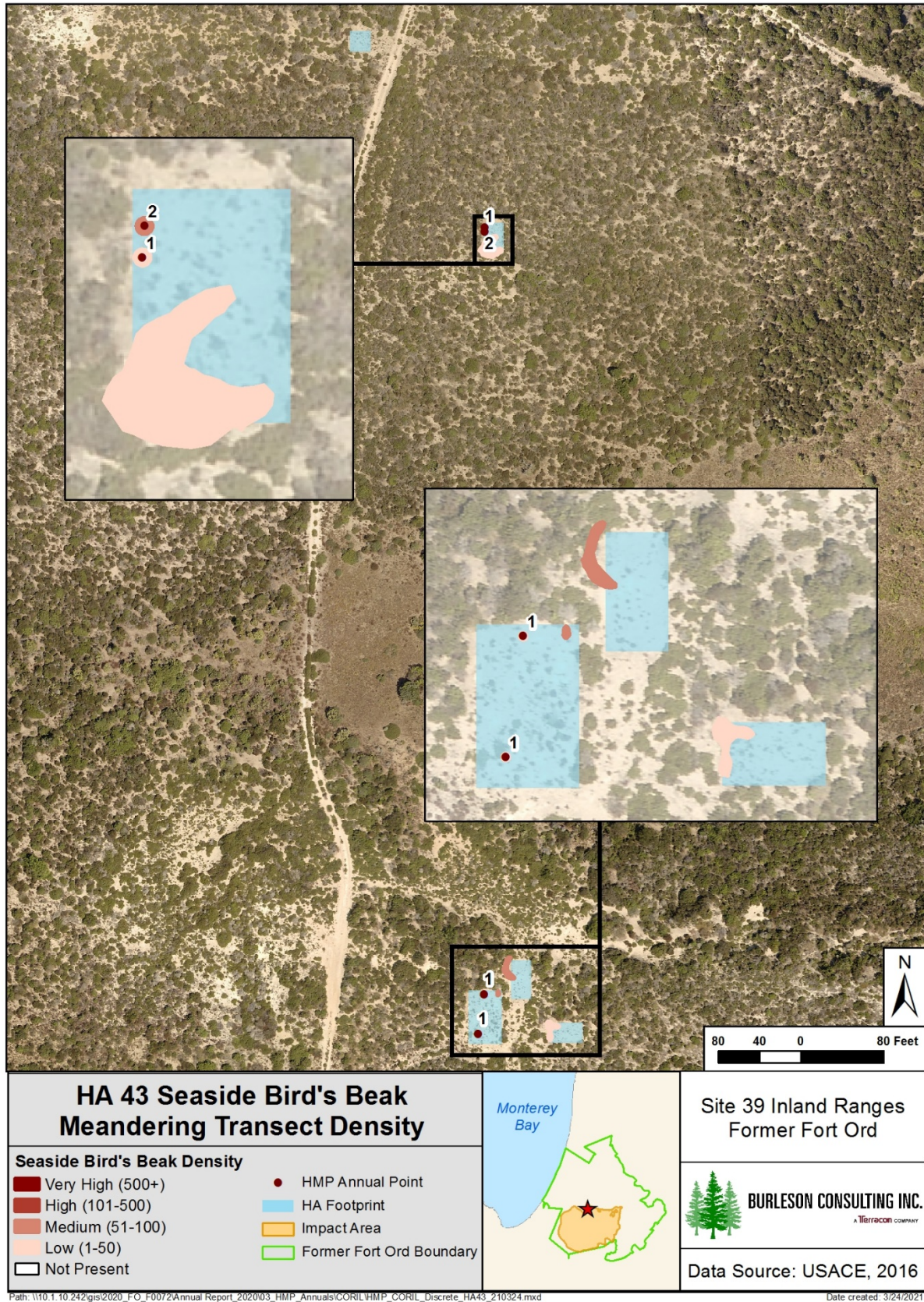


Figure 9-92. HA 43 Seaside Bird's Beak Meandering Transect Density Map

9.16.2.2 Plant Survivorship

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

9.16.2.3 Species Richness

Thirty-four species were observed at HA 43. Of those, 24 were native shrubs or perennials, six were native annual herbaceous species, and four were non-native species (see Table 9-133). Species richness decreased by two species since 2019. Native shrub and perennial species richness increased by one, native herbaceous species richness decreased by four, non-native species richness decreased by two, and uncategorized species richness decreased by one.

Table 9-133. Species Observed at HA 43, 2020

Scientific Names	Common Names	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Cardionema ramosissimum</i>	sand mat	CARA	NP
<i>Carex</i> sp.	sedge	CA	NP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> *	seaside bird's-beak	CORIL	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Festuca octoflora</i>	sixweeks grass	FEOC	NF
<i>Frangula californica</i>	California coffeeberry	FRCA	NP
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA	NNF
<i>Lomatium parvifolium</i>	coastal biscuitroot	LOPA	NP
<i>Lupinus albifrons</i>	silver bush lupine	LUAL	NP
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium californicum</i>	California everlasting	PSCA	NP
<i>Pseudognaphalium luteoalbum</i>	weedy cudweed	PSLU	NNF
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	western bracken fern	PTAQP	NP
<i>Salvia mellifera</i>	black sage	SAME	NP

* HMP species

9.16.2.4 Vegetative Cover

Burleson surveyed five line-intercept transects ranging from eight to 17 meters in length at HA 43. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 30.31%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2019 by 1.28%. Table 9-134 summarizes vegetative cover and Table 9-135 presents vegetative cover by species. Figure 9-93 presents the percent cover of dominant species at HA 43 in 2017, 2018, 2019, and 2020.

Table 9-134. Transect Survey Summary for HA 43

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA43T01	38.94	38.94	0.00	59.53	39.76
HA43T02	15.58	15.58	0.00	28.33	67.33
HA43T03	41.30	41.30	0.00	70.60	25.60
HA43T04	23.45	23.45	0.00	45.64	53.73
HA43T05	29.75	29.75	0.00	66.25	33.75
SITE AVERAGE*	30.31	30.31	0.00	53.28	44.84

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

Table 9-135. Transect Survey Results for HA 43 by Species

Transect	ACGL (%)	ARPU* (%)	CERI* (%)	CRSC (%)	ERCO (%)	HOCU (%)	TH (%)	BG (%)
HA43T01	3.94	13.59	8.53	10.18	0.59	2.12	59.53	39.76
HA43T02	0.00	7.58	0.92	7.08	0.00	0.00	28.33	67.33
HA43T03	10.80	20.40	4.40	4.10	0.00	1.60	70.60	25.60
HA43T04	0.00	22.18	0.00	0.00	0.00	1.27	45.64	53.73
HA43T05	0.00	24.75	0.00	5.00	0.00	0.00	66.25	33.75
SITE AVERAGE†	3.02	16.69	3.45	5.84	0.17	1.14	53.28	44.84

* HMP species

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

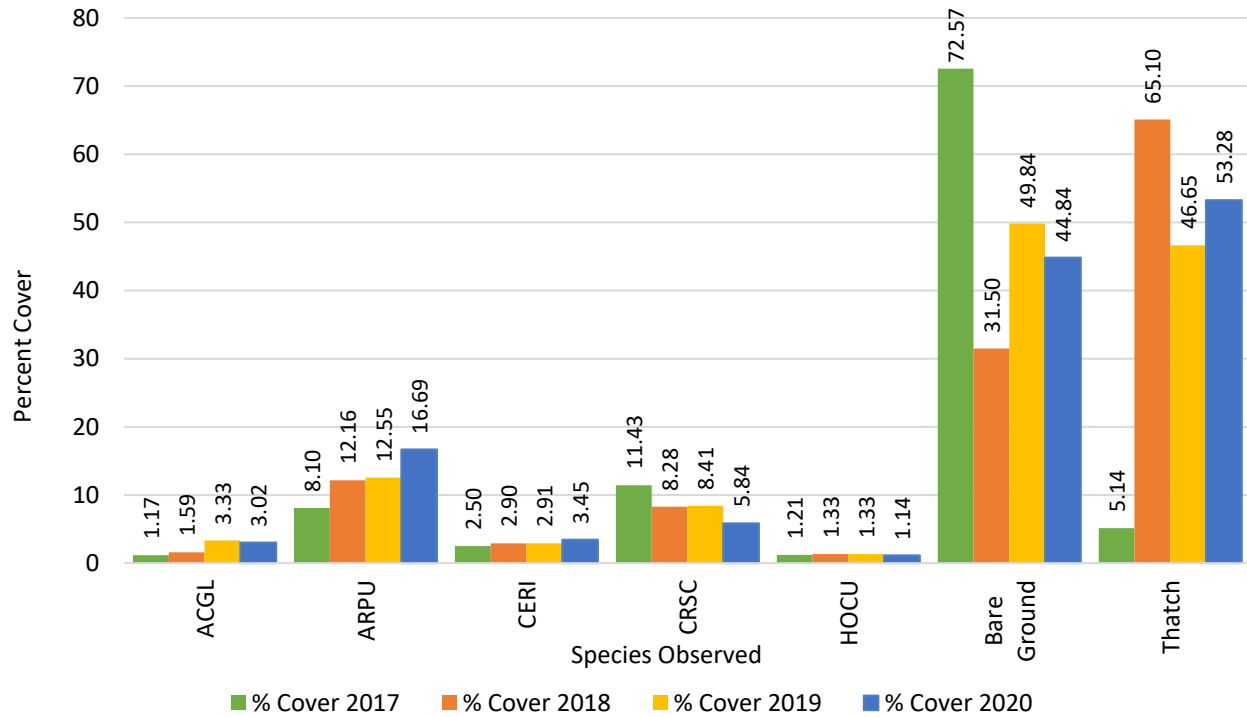


Figure 9-93. Percent Cover of Dominant Species at HA 43 in 2017, 2018, 2019, and 2020.

9.16.3 Discussion

9.16.3.1 Recommendations

HA 43 was in year 8 of monitoring in 2020. The site met three out of six success criteria by 2020. Per recommendations in the 2016 Habitat Restoration Annual Report, sticky monkeyflower, Monterey ceanothus, and chamise were installed during the 2018/2019 season to support species richness (Burleson, 2017). Per recommendation in the 2018 Habitat Restoration Annual Report, additional seed was broadcast in the sand gilia restoration plot to support HMP annual density in the 2020/2021 season. The Army recommends 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. Additionally, the Army will plant Eastwood's golden bush to support HMP shrub cover in the 2021/2022 season. A qualitative overview was documented by reference photo points (see Appendix D, page D-17 and Appendix F, page F-11).

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 9-129). Table 9-136 summarizes the current status of HA 43 including which success criteria were met and recommendations.

Table 9-136. Status and Recommendations for Achieving Success Criteria at HA 43

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	No	Plant Eastwood's goldenbush* (scheduled 2021/2022)
Objective 3 – No. 4	HMP annual density	No	Additional monitoring in 2021 and 2022†

* Recommendation repeated from the 2016 Annual Habitat Restoration Report (Burleson, 2017).

† Not scheduled

9.16.3.2 HMP Annual Density

Monterey spineflower density was within the acceptable limit for HMP annual density at HA 43. The SSRP baseline density class for Monterey spineflower was medium. Year 8 Monterey spineflower restoration plot density was low and did not meet this criterion; however, Monterey spineflower was present outside of the restoration plots. Densities that met or exceeded the success criterion covered 0.01 acres of HA 43. This concludes HMP annual monitoring for Monterey spineflower at HA 43, the success criterion has been met.

Sand gilia density did not meet the acceptable limit for HMP annual density at HA 43. The SSRP baseline density class for sand gilia was medium. Sand gilia was not present in the restoration plot in year 8 and was not observed outside the restoration plot. The plot was reseeded in December 2020 due to low density found in prior monitoring years. Two additional monitoring years will occur to ensure HA 43 meets the target density for sand gilia. After two years the site will be reassessed to determine if monitoring can be concluded.

Seaside bird's beak density was within the acceptable limit for HMP annual density at HA 43. The SSRP baseline density class for seaside bird's beak was medium. Year 8 seaside bird's beak restoration plot density was low and did not meet the success criterion; however, seaside bird's beak was present outside the restoration plots. Densities that met or exceeded the success criterion covered 0.002 acres of HA 43. This concludes HMP annual monitoring for seaside bird's beak at HA 43, the success criterion has been met.

Overall the HMP annual density success criterion was not met at HA 43.

9.16.3.3 Plant Survivorship

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

9.16.3.4 Species Richness

Deerweed, chamise, sandmat manzanita, shaggy-bark manzanita, coyote brush, dwarf ceanothus, Monterey ceanothus, peak rush-rose, sticky monkeyflower, golden yarrow, mock heather, coffeeberry (*Frangula californica* formerly *Rhamnus californica*), wedge-leaved horkelia, and black sage were present. HA 43 included 24 native shrub and perennial species and met the success criterion for Objective 1.

9.16.3.5 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 16 shrub and perennial species presented in Table 2 of the HA 43 SSRP (Burleson, 2013). These species contributed 30.31% cover to the HA; therefore, this success criterion was not met (see Figure 9-94).

In 2016, quadrat surveys were completed to provide a preliminary idea of vegetative cover with a limited amount of effort. From 2017 onward, line-intercept transect surveys were used, as multiple objectives outlined in the SSRP specifically require transect data. The 2016 quadrat data were not compared to the success criteria.

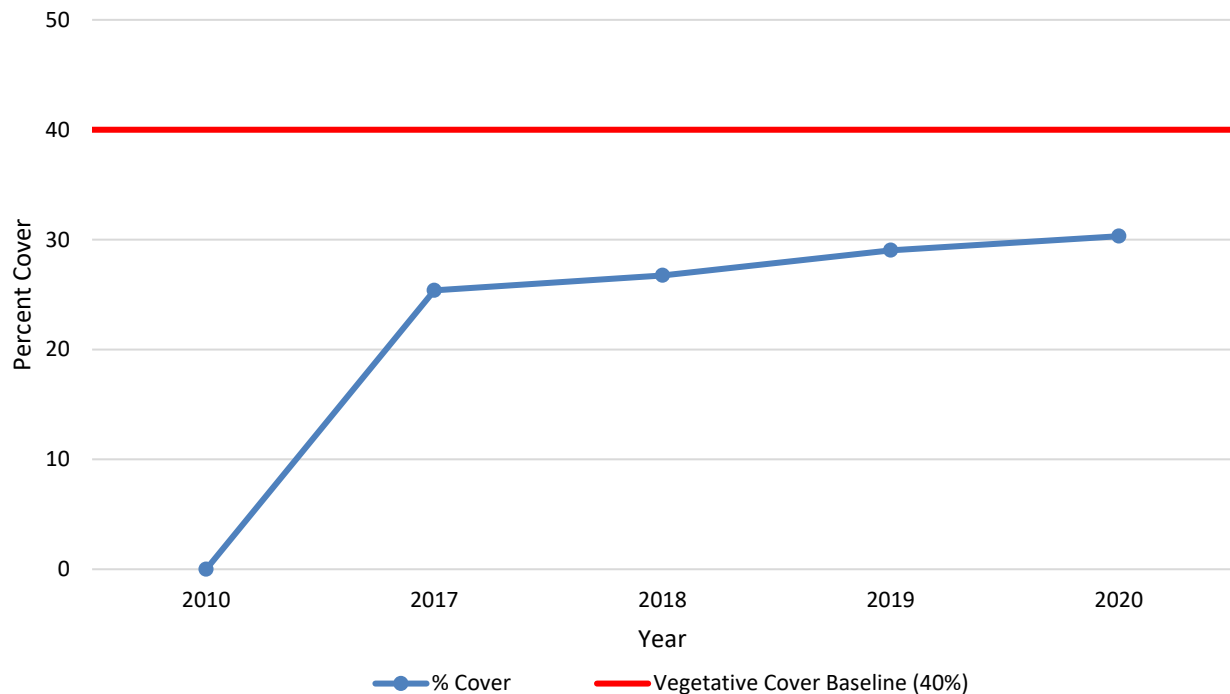


Figure 9-94. Native Vegetative Cover Compared to the Success Criterion at HA 43

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 from 6-25% of absolute cover. The HMP shrub species at HA 43 provided an absolute cover of 20.14%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 43, this means a vegetative cover average of at least 15% cover for Monterey ceanothus, 6% for sandmat manzanita, and 1% for Eastwood's goldenbush. The average vegetative cover for Monterey ceanothus was 3.45%, sandmat manzanita was 16.69%, and Eastwood's goldenbush was 0.00% (see Figure 9-95). Only sandmat manzanita met the acceptable limit. The success criterion was not met.

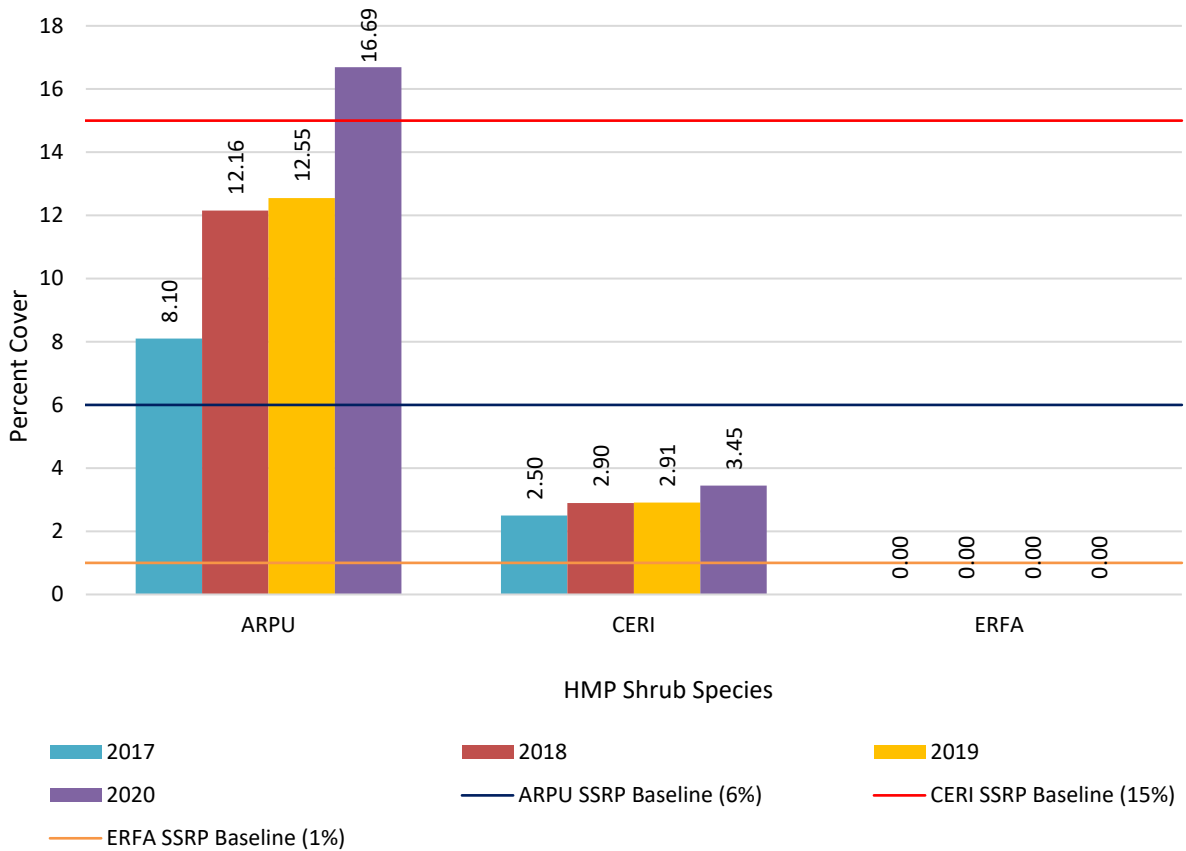


Figure 9-95. HMP Shrub Species Comparison to Success Criteria at HA 43

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 restoration procedure 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. The initial monitoring in 2016 was to assess the level of natural recruitment occurring at that site. HA 44 was monitored for five 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 9-137). Figure 9-96 shows the HA footprint, restoration areas, and transect monitoring locations. The success criteria for HA 44 are summarized in Table 9-138.

Table 9-137. 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			●	●	●				

* Photo points and site visits occur every year regardless of the monitoring year

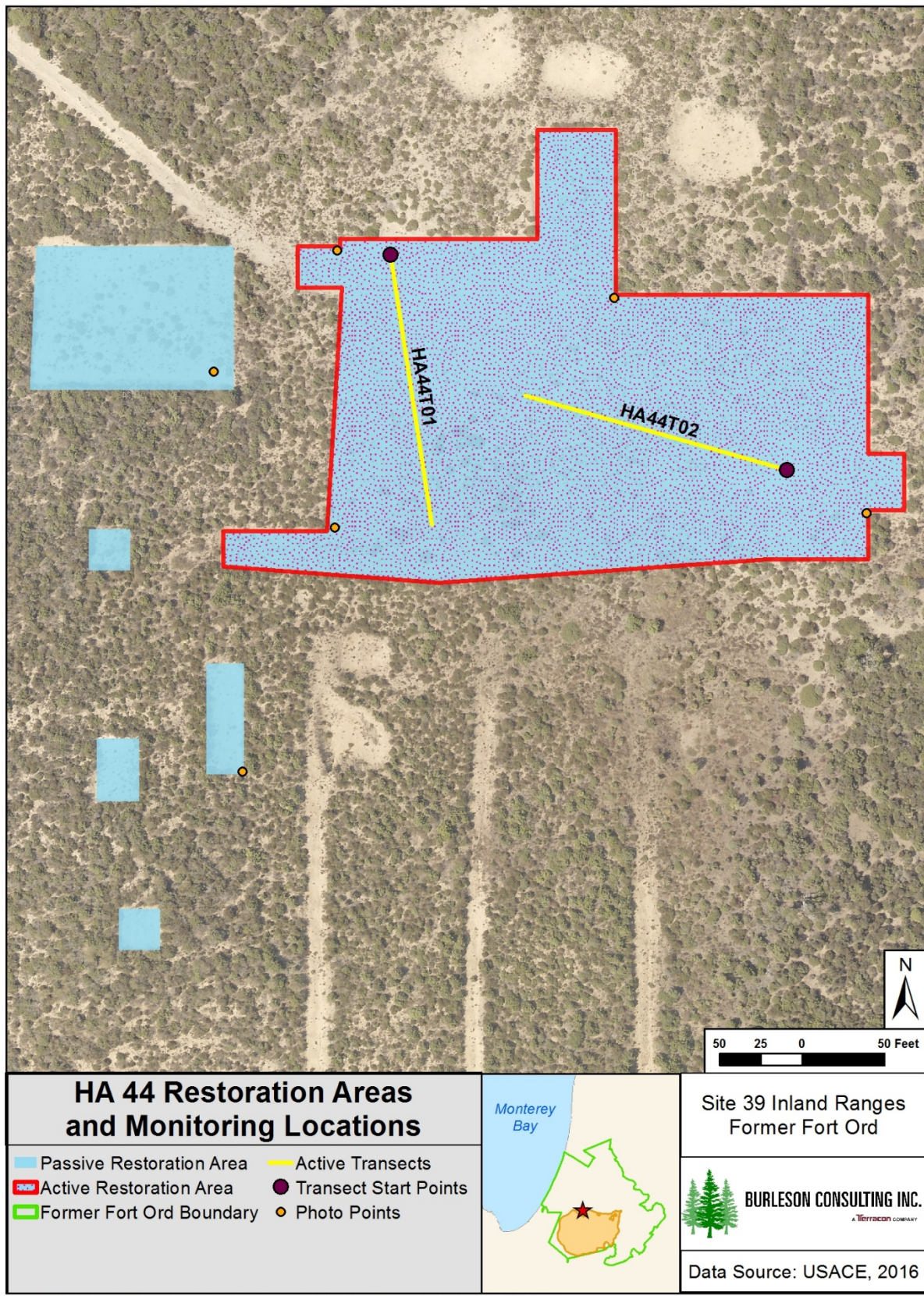


Figure 9-96. HA 44 Restoration Areas and Monitoring Locations Map

Table 9-138. 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
		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 9-139 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-139. 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 9-140 summarizes the plants installed during active restoration.

Table 9-140. 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.

Fourteen individual plants and 24 discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-97). 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 0.2 acre. From 2019 to 2020, the density range and acreage above the SSRP baseline increased.

Three individual plants and three discrete patches of sand gilia were mapped and individuals counted within each patch (see Figure 9-98). Densities were low and the total acreage of sand gilia patches with a density at or above the SSRP baseline density class of low was 0.01 acre. From 2019 to 2020, the density range and acreage above the SSRP baseline increased since no discrete patches were observed in 2019.

One individual plant and three discrete patches of seaside bird's beak were mapped and individuals counted within each patch (see Figure 9-99). 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 0.11 acre. From 2019 to 2020, the density range remained the same and acreage above the SSRP baseline decreased.

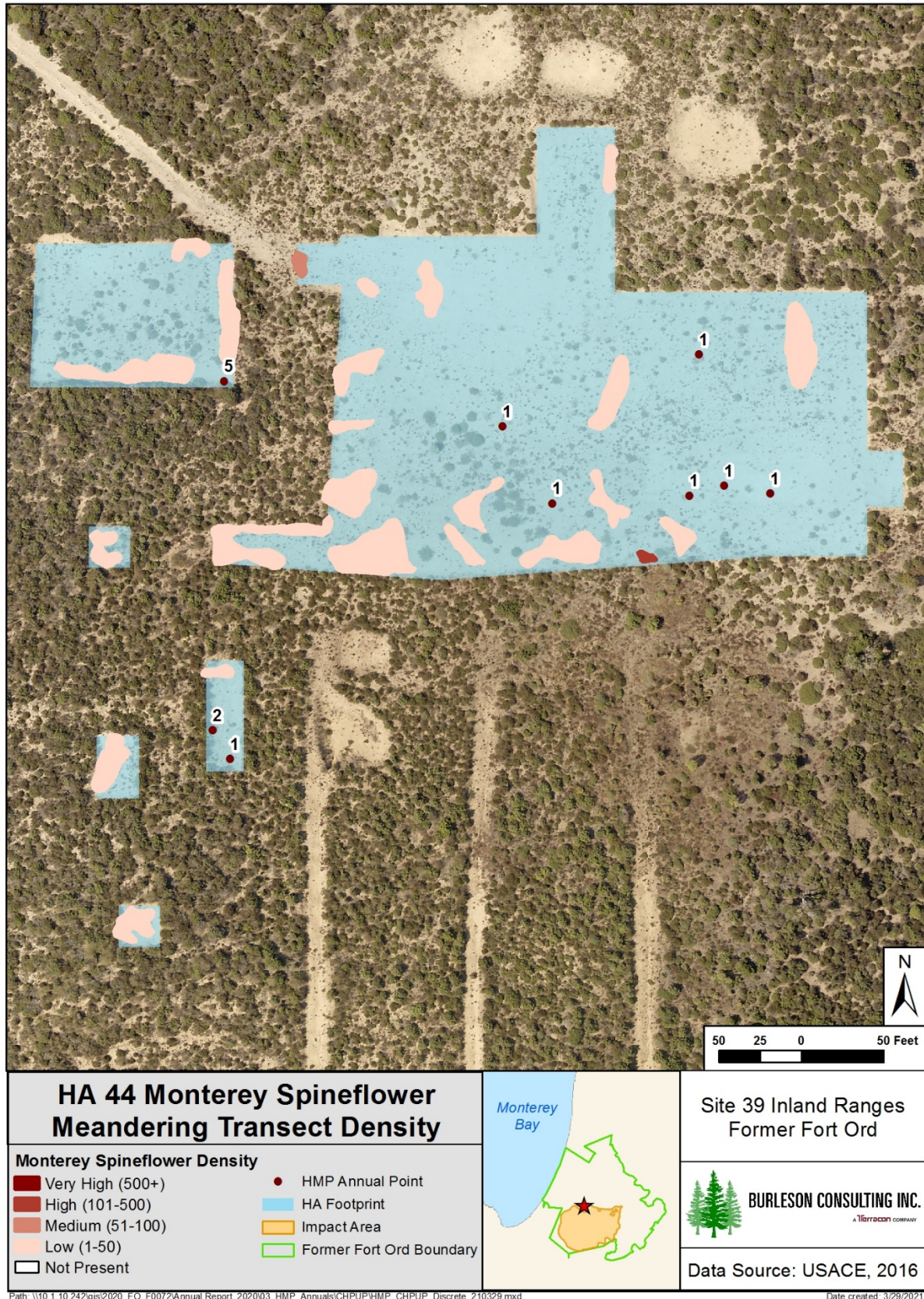


Figure 9-97. HA 44 Monterey Spineflower Meandering Transect Density Map

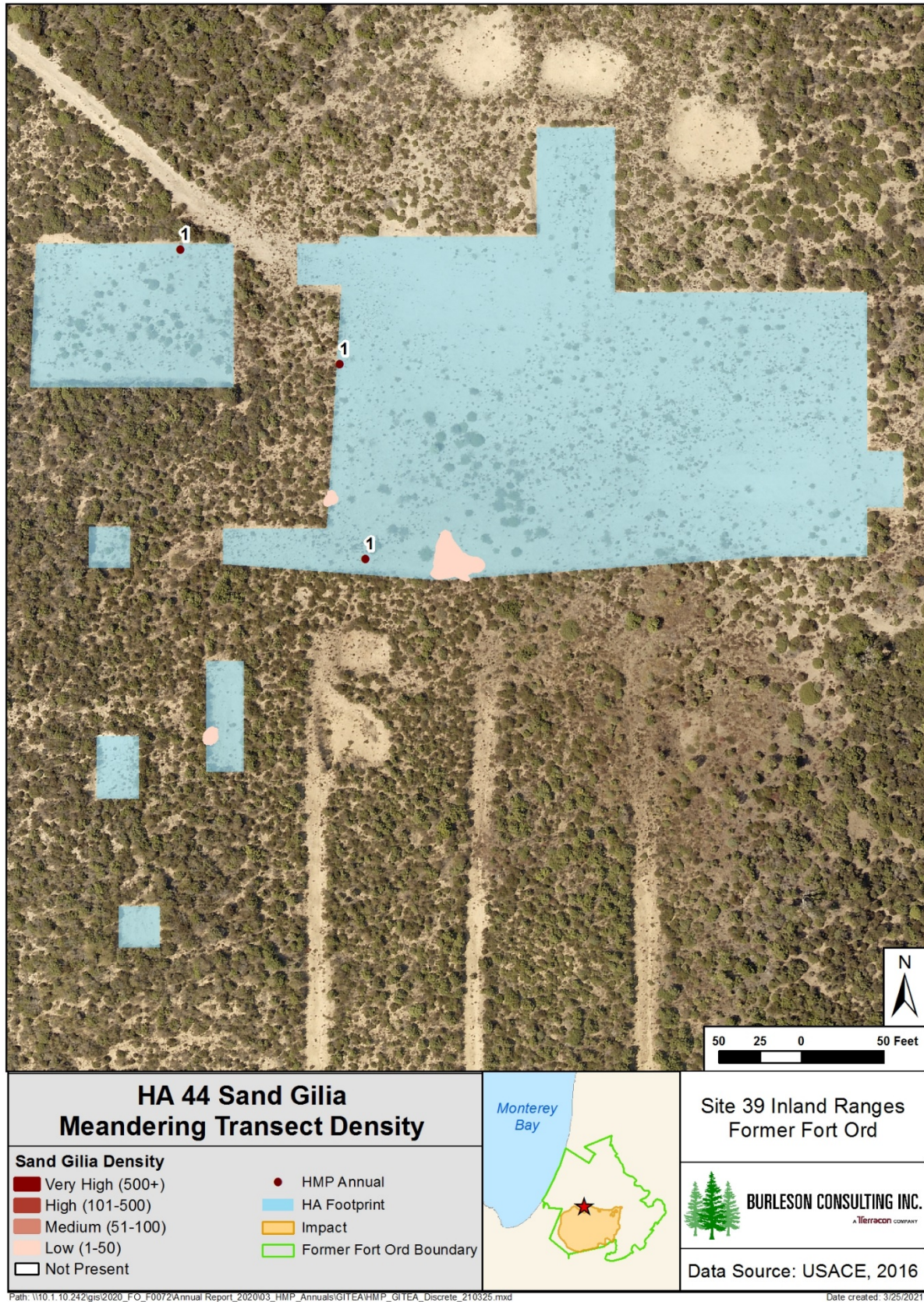


Figure 9-98. HA 44 Sand Gilia Meandering Transect Density Map

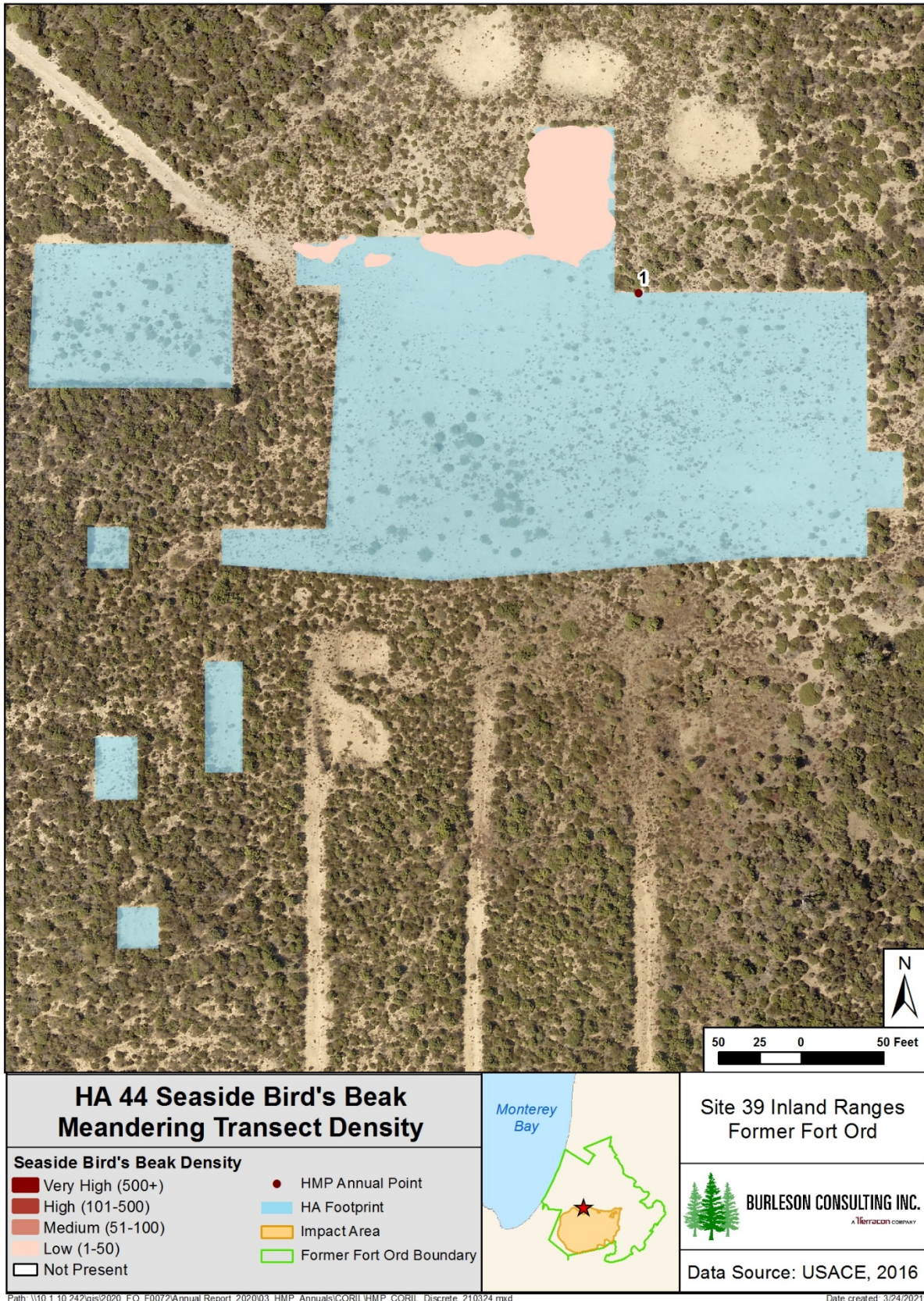


Figure 9-99. HA 44 Seaside Bird's Beak Meandering Transect Density Map

9.17.2.2 Plant Survivorship

Plant survivorship monitoring was conducted at HA 44 for plants installed in 2018. A total of eight shrub species and 86 individual plants were monitored for survivorship. By year 3 of monitoring for the 2018 planting, survivorship was 55%; survivorship decreased from 57% in 2019. Table 9-141 presents results by species.

Table 9-141. Plant Survivorship Monitoring Summary for 2018 Plantings at HA 44

Species	Planted (# ind.)	Monitored (# ind.)	Year One (2018)	Year Two (2019)	Year Three (2020)
			Alive (%)	Alive (%)	Alive (%)
ADFA	144	14	79	71	71
ARPU*	40	4	100	100	75
ARTO	52	6	50	33	33
BAPI	87	9	89	89	89
CERI*	101	10	20	20	20
FRCA	300	32	63	63	59
LUAL	68	7	29	14	14
SAME	37	4	75	50	50
TOTAL	829	86	62	57	55

* HMP Species

9.17.2.3 Species Richness

Thirty-eight species were observed at HA 44. Of those, 26 were native shrubs or perennials, eight were native annual herbaceous species, three were non-native species, and one was not categorized as it was only identified to genus (see Table 9-142). Species richness decreased by 11 species since 2019. Native shrub and perennial species richness decreased by five, native herbaceous species richness decreased by four, non-native species richness decreased by two, and uncategorized species richness remained the same.

Table 9-142. Species Observed on HA 44, 2020

Scientific Names	Common Names	Code	Category
<i>Achillea millefolium</i>	common yarrow	ACMI	NP
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Arctostaphylos montereyensis</i> *	Monterey manzanita	ARMO	NP
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Carex</i> sp.	sedge	CA	NP
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Chorizanthe diffusa</i>	diffuse spineflower	CHDI	NF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Cirsium occidentale</i> var. <i>candidissimum</i>	snowy thistle	CIOCC	NP

Table 9-142. Species Observed on HA 44, 2020

Scientific Names	Common Names	Code	Category
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> *	seaside bird's-beak	CORIL	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	ERFA	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI	NNF
<i>Frangula californica</i>	California coffeeberry	FRCA	NP
<i>Gastridium phleoides</i>	nit grass	GAPH	NNF
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	GITEA	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Lupinus albifrons</i>	silver bush lupine	LUAL	NP
<i>Lupinus chamissonis</i>	silver beach lupine	LUCH	NP
<i>Lupinus nanus</i>	sky lupine	LUNA	NF
<i>Monardella sinuata</i> ssp. <i>nigrescens</i>	curly-leaved monardella	MOSIN	NF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium</i> sp.	cudweed	PS	
<i>Pteridium aquilinum</i> var. <i>pubescens</i>	western bracken fern	PTAQP	NP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Solanum umbelliferum</i>	blue witch	SOUM	NP
<i>Toxicodendron diversilobum</i>	poison oak	TODI	NP

* HMP species

9.17.2.4 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 33.73%. The mean vegetative cover by native shrubs and perennials was greater in 2020 than 2019 by 2.66%. Table 9-143 summarizes vegetative cover and Table 9-144 presents vegetative cover by species. Figure 9-100 presents the percent cover of dominant species at HA 44 in 2016, 2017, 2018, 2019, and 2020.

Table 9-143. Transect Survey Summary for HA 44

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA44T01	33.00	33.00	0.00	48.52	49.50
HA44T02	34.46	34.46	0.00	40.66	51.30
SITE AVERAGE	33.73	33.73	0.00	44.59	50.40

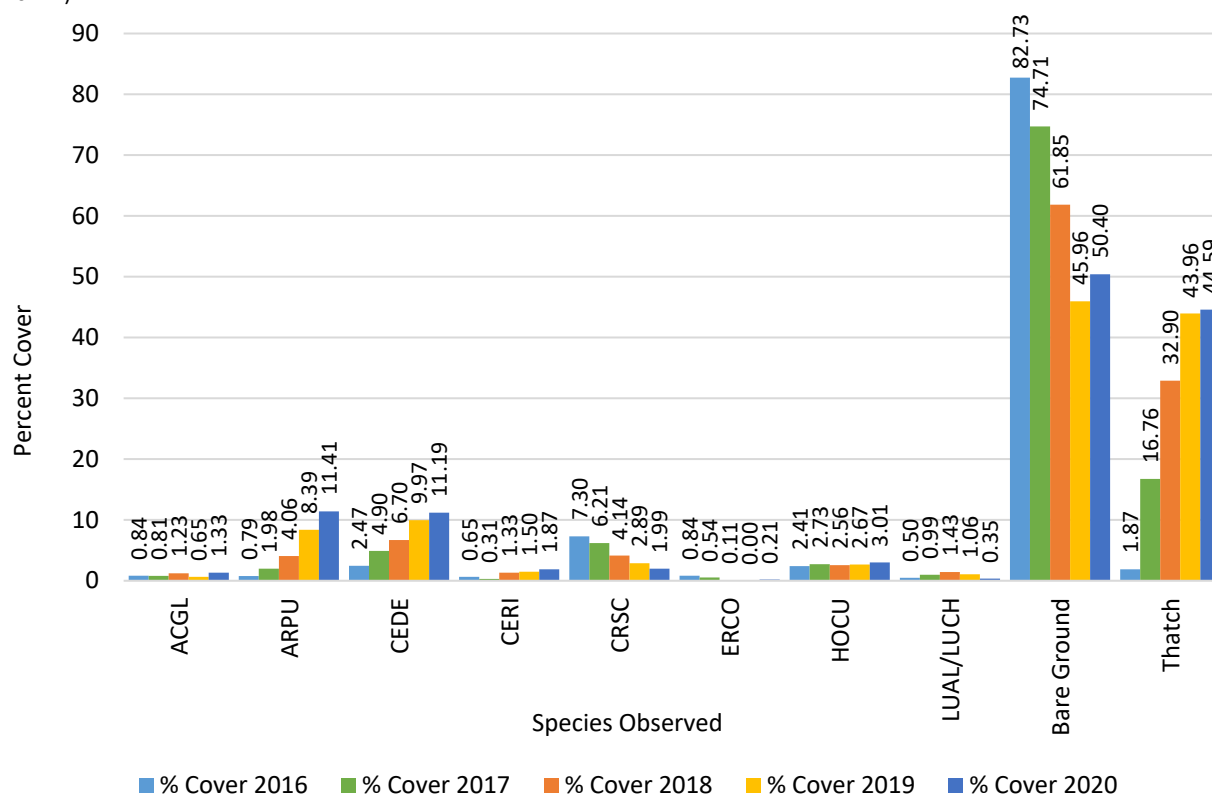
Table 9-144. Transect Survey Results for HA 44 by Species

Transect	ACGL (%)	ADFA (%)	ARPU* (%)	ARTO (%)	CA (%)	CEDE (%)	CERI* (%)	COFI (%)
HA44T01	2.66	2.42	9.28	0.00	0.66	8.40	2.36	0.58
HA44T02	0.00	0.00	13.54	0.70	0.00	13.98	1.38	0.00
SITE AVERAGE	1.33	1.21	11.41	0.35	0.33	11.19	1.87	0.29

Table 9-144 (continued). Transect Survey Results for HA 44 by Species

Transect	CRSC (%)	ERCO (%)	ERFA* (%)	HOCU (%)	LUAL/LUCH† (%)	TH (%)	BG (%)
HA44T01	1.06	0.42	0.38	4.58	0.20	48.52	49.50
HA44T02	2.92	0.00	0.00	1.44	0.50	40.66	51.30
SITE AVERAGE	1.99	0.21	0.19	3.01	0.35	44.59	50.40

* 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 9-100.** Percent Cover of Dominant Species at HA 44 in 2016, 2017, 2018, 2019, and 2020.

9.17.3 Discussion

9.17.3.1 Recommendations

HA 44 was in year 3 of monitoring in 2020. The site met five of six success criteria by 2020. 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).

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 4, 2021 (see Table 9-137). Table 9-145 summarizes the current status of HA 44 including which success criteria were met and recommendations.

Table 9-145. Status and Recommendations for Achieving Success Criteria at HA 44

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	Yes	None
Objective 3 – No. 4	HMP annual density	Yes	Establishment of restoration plots not necessary

9.17.3.2 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.

9.17.3.3 Plant Survivorship

Plant survivorship was moderate for the 2018 planting at HA 44. Monterey ceanothus, shaggy-bark manzanita, and silver bush lupine had low survivorship, whereas all other species had moderate to high survivorship. Low survivorship for Monterey ceanothus and lupine was not surprising because they had low survivorship at multiple sites.

9.17.3.4 Species Richness

Chamise, sandmat manzanita, shaggy-bark manzanita, Monterey ceanothus, and coffeeberry were all present. HA 44 included 26 native shrub and perennial species and met the success criterion for Objective 1.

9.17.3.5 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 21.38% cover to the HA; therefore, this success criterion was not met (see Figure 9-101).

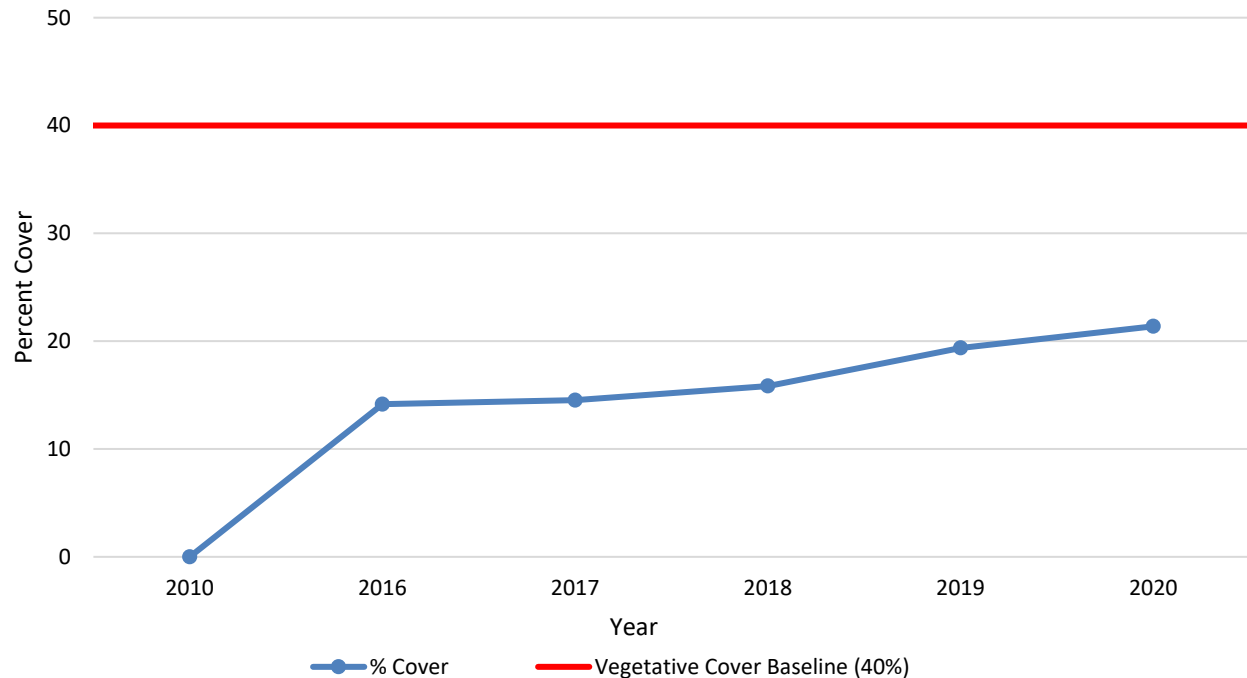


Figure 9-101. Native Vegetative Cover Compared to the Success Criterion at HA 44

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 13.28%; 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 11.41% and Monterey ceanothus was 1.87% (see Figure 9-102). Both sandmat manzanita and Monterey ceanothus cover were within the acceptable limit; therefore, the success criterion was met.

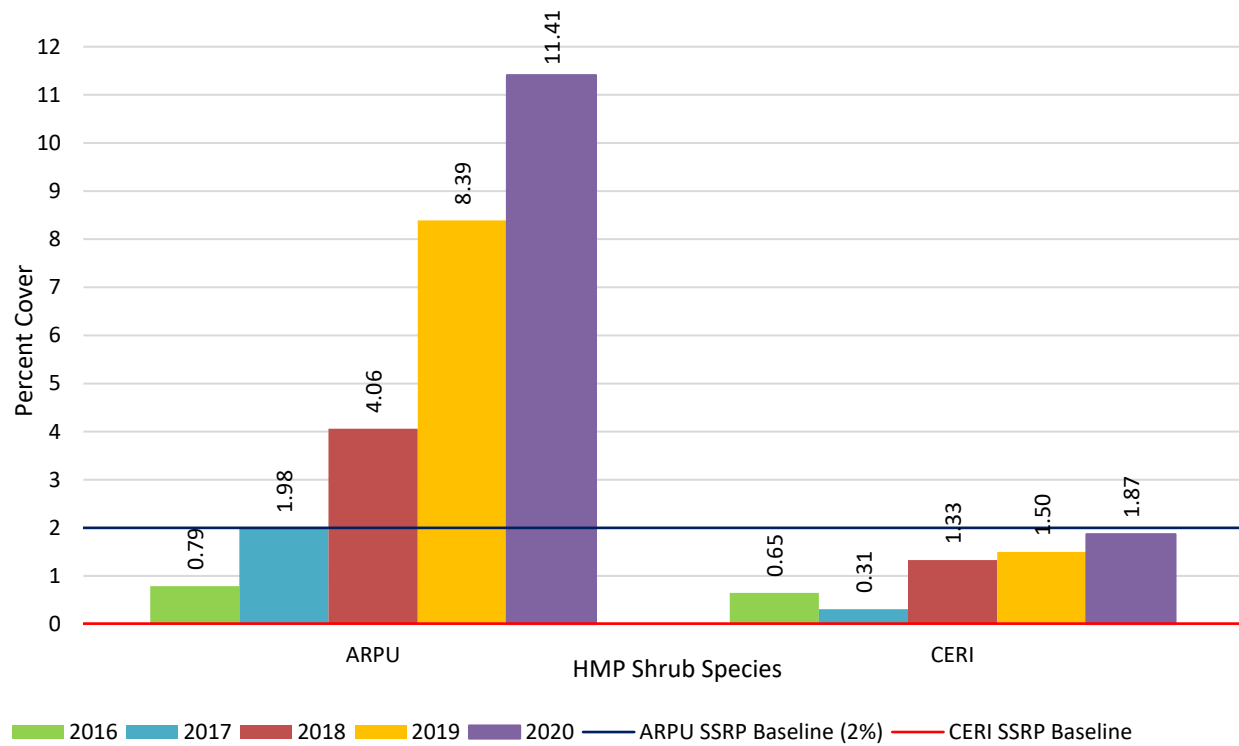


Figure 9-102. HMP Shrub Species Comparison to Success Criteria at HA 44

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 was excavated over 0.05 acre. 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. Monitoring began in 2016. HA 48 was monitored for five years by photo documentation and site visits, HMP annual density across the HA, and species richness, and four years for vegetative cover (see Table 9-146). Figure 9-103 shows the HA footprint, passive restoration areas, and photo point monitoring locations. Success criteria for HA 48 are summarized in Table 9-147.

Table 9-146. Historic Summary of Restoration and Monitoring Activities at HA 48

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

* Photo points and site visits occur every year regardless of the monitoring year

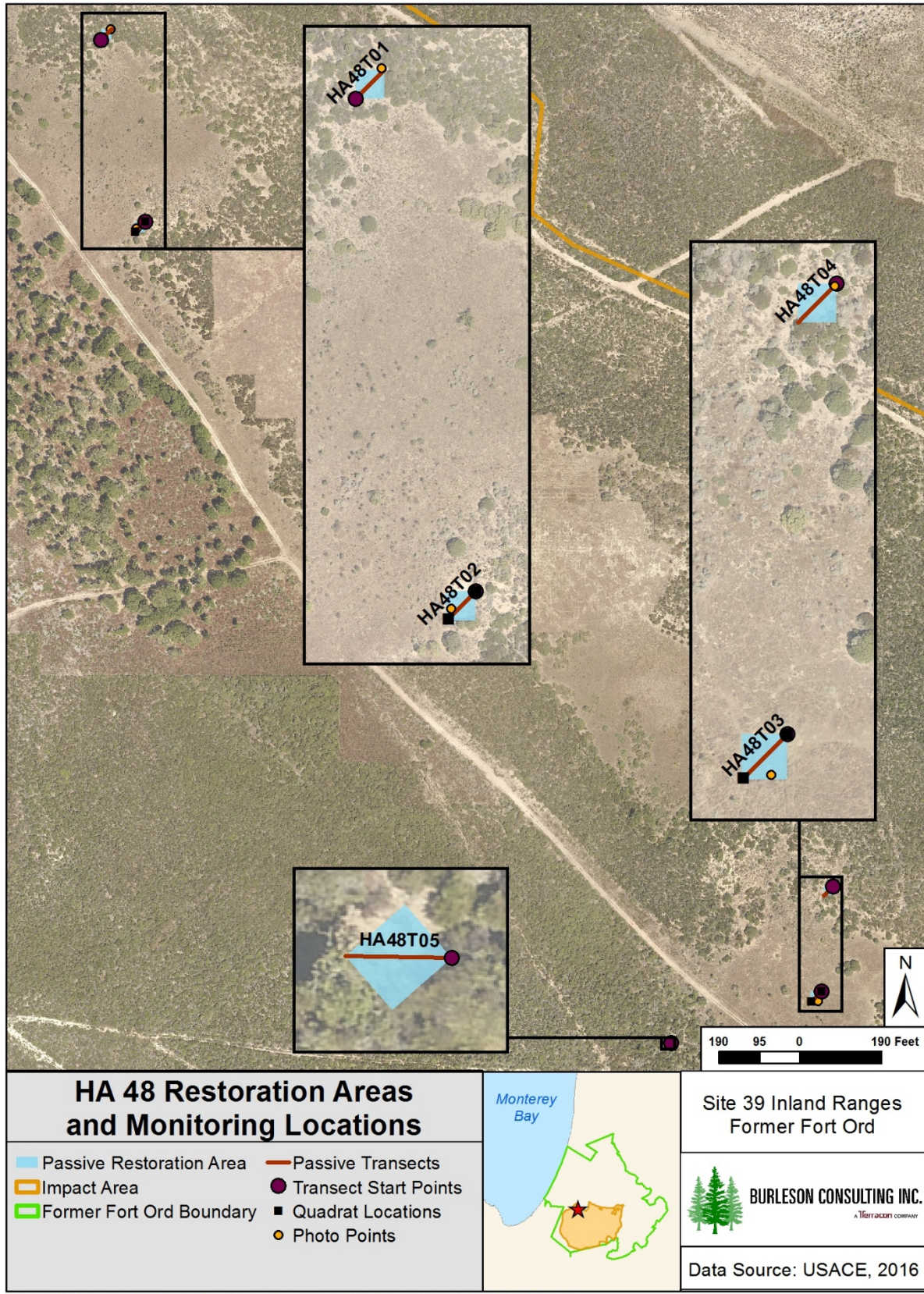


Figure 9-103. HA 48 Restoration Areas and Monitoring Locations Map

Table 9-147. 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
		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. No additional passive restoration activities occurred in 2020. 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 9-148 summarizes the SSRP seed target and the amount of seed applied by year and species.

Table 9-148. 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, 2019a). A total of 20 plants were installed at HA 48. Table 9-149 summarizes the plants installed during active restoration.

Table 9-149. 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

9.18.2.1 HMP Annual Density

No restoration plots were established for HMP annuals at HA 48. However, HMP annuals were mapped as a part of the meandering transect survey. This survey was completed for Monterey spineflower and sand gilia at HA 48.

Four discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-104). 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 0.05 acre. From 2019 to 2020, the density range and acreage above the SSRP baseline increased.

One discrete patch of sand gilia was mapped and individual plants were counted within the patch (see Figure 9-105). The density was low and the total acreage of the sand gilia patch with a density at or above the SSRP baseline density class of low was 0.0004 acre. Sand gilia was not observed at HA 48 in 2019 but was present in 2018 with low density and the total acreage was 0.001 acre.

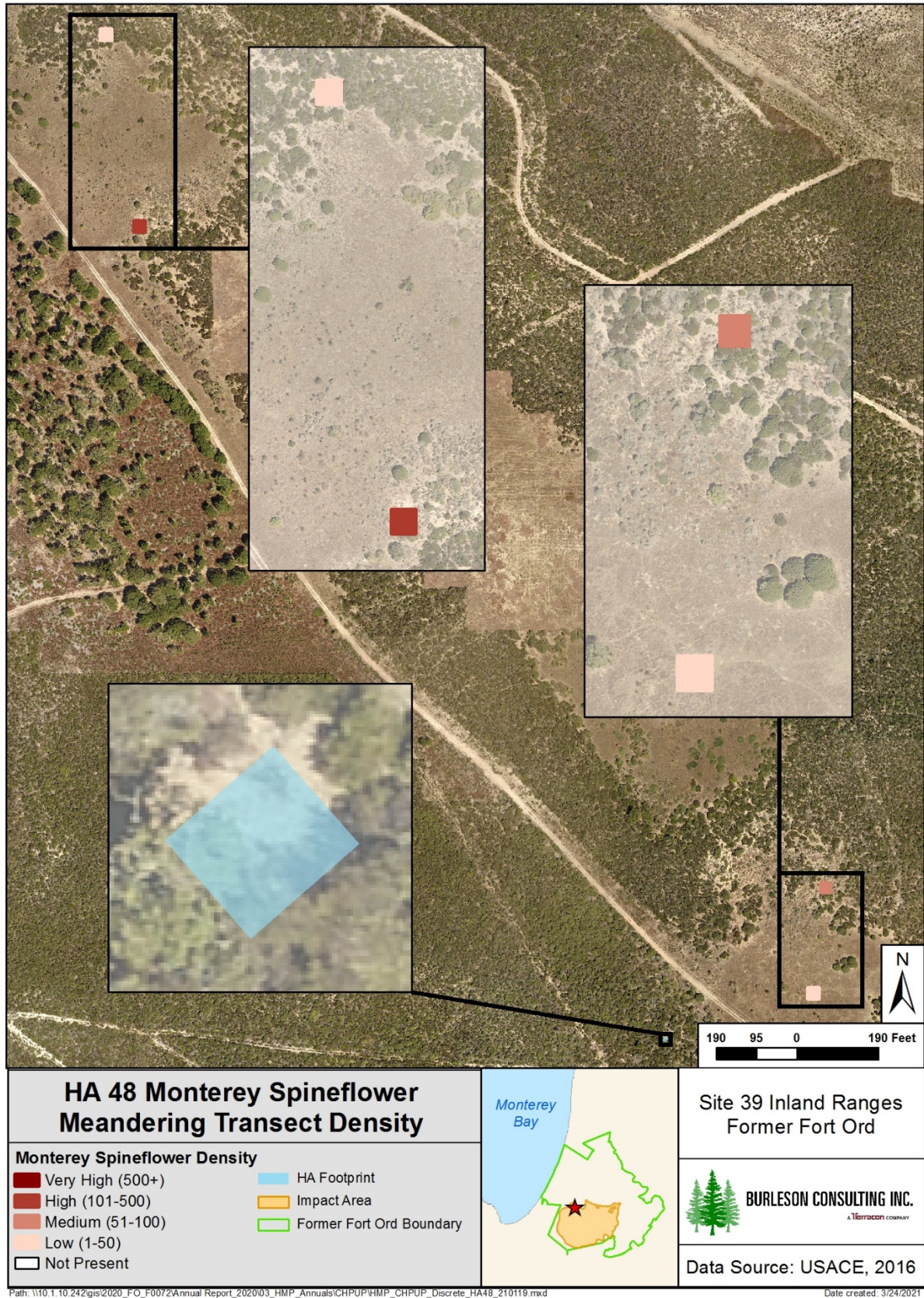


Figure 9-104. HA 48 Monterey Spineflower Meandering Transect Density Map

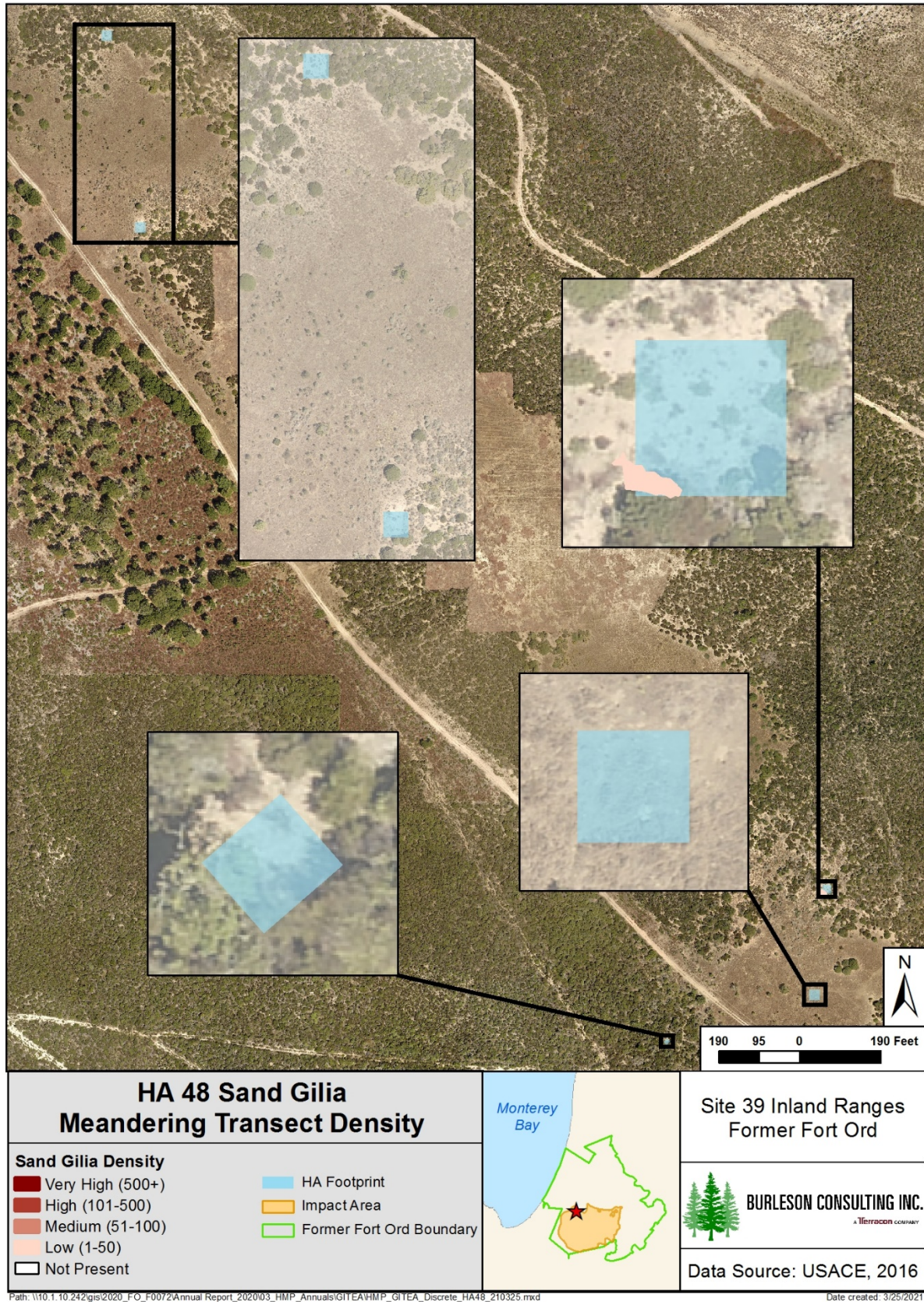


Figure 9-105. HA 48 Sand Gilia Meandering Transect Density Map

9.18.2.2 Plant Survivorship

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

9.18.2.3 Species Richness

Fifty-nine species were observed at HA 48. Of those, 25 were native shrubs or perennials, 19 were native annual herbaceous species, and 15 were non-native species (see Table 9-150). Species richness increased by six species since 2019. Native shrub and perennial species richness remained the same, native herbaceous species richness increased by three, and non-native species richness increased by three.

Table 9-150. Species Observed on HA 48, 2020

Scientific Name	Common Name	Code	Category
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophyllea</i>	silver hair grass	AICA	NNF
<i>Amsinckia intermedia</i>	common fiddleneck	AMIN	NF
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Bromus hordeaceus</i>	soft chess	BRHO	NNF
<i>Bromus madritensis</i> ssp. <i>rubens</i>	foxtail chess	BRMAR	NNF
<i>Calandrinia menziesii</i>	red maids	CAME	NF
<i>Carex</i> sp.	sedge	CA	NP
<i>Castilleja densiflora</i>	owl's clover	CADE	NF
<i>Castilleja exserta</i> ssp. <i>exserta</i>	purple owl's-clover	CAEX	NF
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Ceanothus rigidus</i> *	Monterey ceanothus	CERI	NP
<i>Ceanothus thyrsiflorus</i>	blueblossom	CETH	NP
<i>Centaurea melitensis</i>	totalote	CEME	NNF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Clarkia purpurea</i> ssp. <i>quadrivulnera</i>	winecup clarkia	CLPUQ	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Croton californicus</i>	California croton	CRCA	NP
<i>Deinandra corymbosa</i>	coastal tarweed	DECO	NF
<i>Dichelostemma capitatum</i>	blue dicks	DICA	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Elymus glaucus</i>	blue wild-rye	ELGL	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Erigeron canadensis</i>	horseweed	ERCA	NF
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Eschscholzia californica</i>	California poppy	ESCA	NF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Frangula californica</i>	California coffeeberry	FRCA	NP
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	GITEA	NF
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF

Table 9-150. Species Observed on HA 48, 2020

Scientific Name	Common Name	Code	Category
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris glabra</i>	smooth cat's ear	HYGL	NNF
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Koeleria macrantha</i>	june grass	KOMA	NP
<i>Layia platyglossa</i>	tidy-tips	LAPL	NF
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA	NNF
<i>Lupinus albifrons</i>	silver bush lupine	LUAL	NP
<i>Lupinus arboreus</i>	yellow bush lupine	LUAR	NP
<i>Lupinus chamissonis</i>	silver beach lupine	LUCH	NP
<i>Lupinus nanus</i>	sky lupine	LUNA	NF
<i>Madia gracilis</i>	slender tarweed	MAGR	NF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF
<i>Petrorhagia dubia</i>	hairypink	PEDU	NNF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Quercus agrifolia</i>	coast live oak	QUAG	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Silene gallica</i>	small-flower catchfly	SIGA	NNF
<i>Stylocline gnaphaloides</i>	everlasting neststraw	STGN	NF
<i>Vicia sativa</i> ssp. <i>nigra</i>	narrow-leaved vetch	VISAN	NNF

* HMP species

9.18.2.4 Vegetative Cover

Burleson surveyed five line-intercept transects ranging from 4.5 to 11 meters in length and four associated quadrats at HA 48. The transect survey results indicated that the mean vegetative cover by native shrubs and perennials was 34.02%. The mean vegetative cover by native shrubs and perennials was lower in 2020 than 2019 by 2.47%. Quadrats were completed along a transect line when 10% or more of the transect line was herbaceous cover, in accordance with the Monitoring Protocol (Burleson, 2009). Quadrats were completed for two transects (T02 and T03) at HA 48. Table 9-151 summarizes vegetative cover, Table 9-152 presents vegetative cover by species, and Table 9-153 presents quadrat results. Figure 9-106 presents the percent cover of dominant species at HA 48 in 2017, 2018, 2019, and 2020.

Table 9-151. Transect Survey Summary for HA 48

Transect ID	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA48T01	66.84	66.84	0.00	84.84	10.00
HA48T02	23.55	16.82	6.73	73.64	25.09
HA48T03	63.43	15.90	47.52	100.00	0.00
HA48T04	45.14	45.14	0.00	60.14	39.86
HA48T05	31.78	31.78	0.00	100.00	0.00
SITE AVERAGE*	47.51	34.02	13.48	83.22	15.29

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

Table 9-152. Transect Survey Results for HA 48 by Species

Transect	ACGL (%)	AICA (%)	ARPU* (%)	AVBA (%)	CA (%)	CERI* (%)	CHPUP* (%)	CRSC (%)
HA48T01	1.47	0.00	61.47	0.00	0.00	2.84	0.00	0.00
HA48T02	0.00	6.73	0.00	0.00	0.00	0.00	0.00	0.00
HA48T03	4.48	39.43	0.00	4.38	0.00	0.00	0.95	0.00
HA48T04	0.00	0.00	38.71	0.00	3.29	0.00	0.00	3.14
HA48T05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SITE AVERAGE	1.44	11.48	20.12	1.08	0.54	0.64	0.24	0.52

* HMP species

Table 9-152 (continued). Transect Survey Results for HA 48 by Species

Transect	DECO (%)	ERER (%)	ESCA (%)	LUAR (%)	QUAG (%)	RUAC (%)	TH (%)	BG (%)
HA48T01	0.00	0.00	1.05	0.00	0.00	0.00	84.84	10.00
HA48T02	3.27	13.55	0.00	0.00	0.00	0.00	73.64	25.09
HA48T03	0.00	0.00	4.86	5.62	0.00	3.71	100.00	0.00
HA48T04	0.00	0.00	0.00	0.00	0.00	0.00	60.14	39.86
HA48T05	0.00	0.00	0.00	0.00	31.78	0.00	100.00	0.00
SITE AVERAGE	0.85	3.51	1.44	1.39	3.36	0.92	83.22	15.29

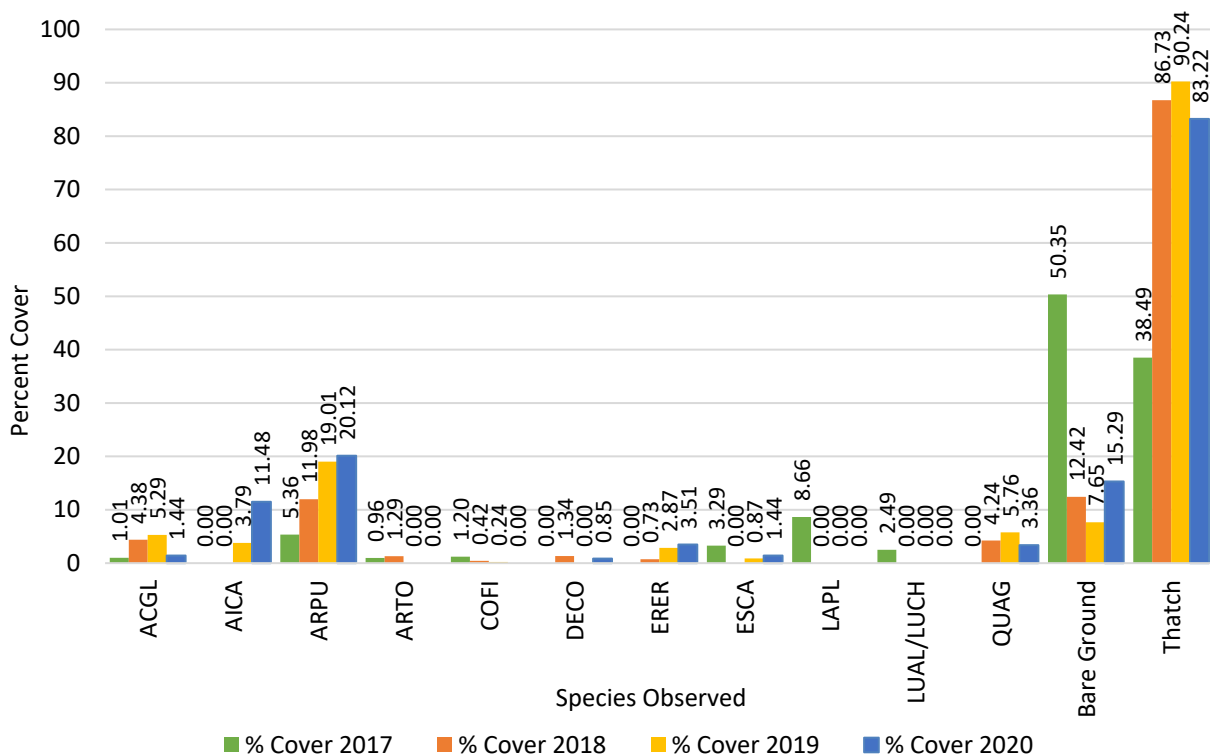
**Figure 9-106. Percent Cover of Dominant Species at HA 48 in 2017, 2018, 2019, and 2020.**

Table 9-153. Quadrat Summary for HA 48 Transects T02 and T03

Quadrat	Total Vegetative Cover (%)	Native Shrub and Perennial Cover (%)	Native Herbaceous Cover (%)	Non-Native Vegetative Cover (%)	Thatch (%)	Bare Ground (%)
HA48T02Q01	6	0	6	0	20	74
HA48T02Q02	54	0	25	29	30	16
HA48T03Q01	58	0	22	36	42	0
HA48T03Q02	79	0	12	67	17	4
SITE AVERAGE	49	0	16	33	27	24

9.18.3 Discussion

9.18.3.1 Recommendations

HA 48 was in year 5 of monitoring in 2020. The site met five of six success criteria by 2020. SSRP restoration prescriptions have not been fulfilled at HA 48. Per recommendations in the 2016 Annual Habitat Restoration 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 and Appendix E, E-2).

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 9-154 summarizes the current status of HA 48 including which success criteria were met and recommendations.

Table 9-154. Status and Recommendations for Achieving Success Criteria at HA 48

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	Yes	None
Objective 1 – No. 2	Native vegetation cover	No	Wait to see how the HA responds
Objective 2 – No. 3	Non-native target weed cover	Yes	None
Objective 3 – No. 4	HMP shrub cover	Yes	None
Objective 3 – No. 4	HMP shrub cover by species	Yes	None
Objective 3 – No. 4	HMP annual density	Yes	None

9.18.3.2 HMP Annual Density

No restoration plots were established for HMP annuals at HA 48. However, HMP annuals were mapped as part of the meandering transect survey. Both Monterey spineflower and sand gilia met or exceeded the density success criterion.

9.18.3.3 Plant Survivorship

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

9.18.3.4 Species Richness

Chamise, sandmat manzanita, shaggy-bark manzanita, Monterey ceanothus, peak rush-rose, wedge-leaved horkelia, silver bush lupine, and black sage were present. HA 48 included 25 native shrub and perennial species and met the species richness success criterion for Objective 1.

9.18.3.5 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 species presented in Table 2 of the HA 48 SSRP (Burlison, 2013). The list did not include sandmat manzanita even though it is a required HMP shrub species for the site; however, sandmat manzanita was included in the calculation for the vegetative cover. These species contributed 28.38% cover to the HA (see Figure 9-107). This success criterion was not met.

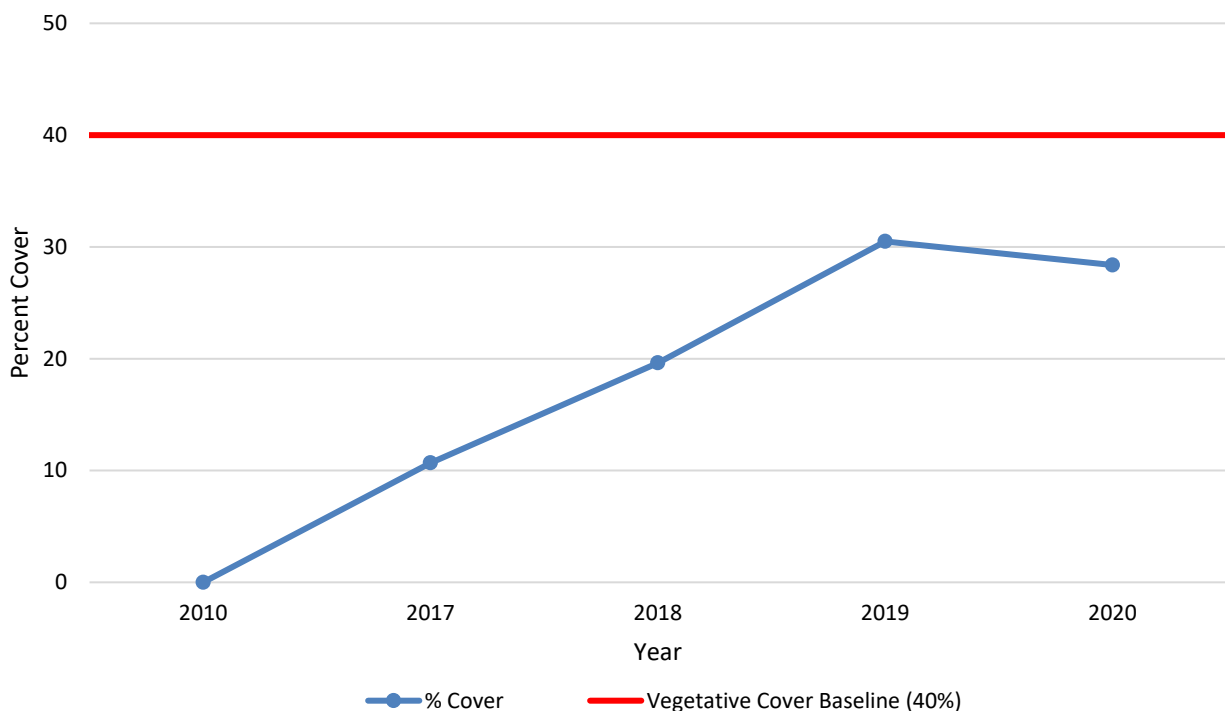


Figure 9-107. Native Vegetative Cover Compared to the Success Criterion at HA 48

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 48 provided an absolute cover of 20.75%; therefore, the HA met this success criterion. The second success criterion is no net loss of HMP shrubs. For HA 48, this means a vegetative cover average of at least 1% for sandmat manzanita and Monterey ceanothus must be present. The average vegetative cover for sandmat manzanita was 20.12% and Monterey ceanothus was 0.64% (see Figure 9-108). Sandmat manzanita and Monterey ceanothus met the acceptable limit; therefore, the success criterion was met.

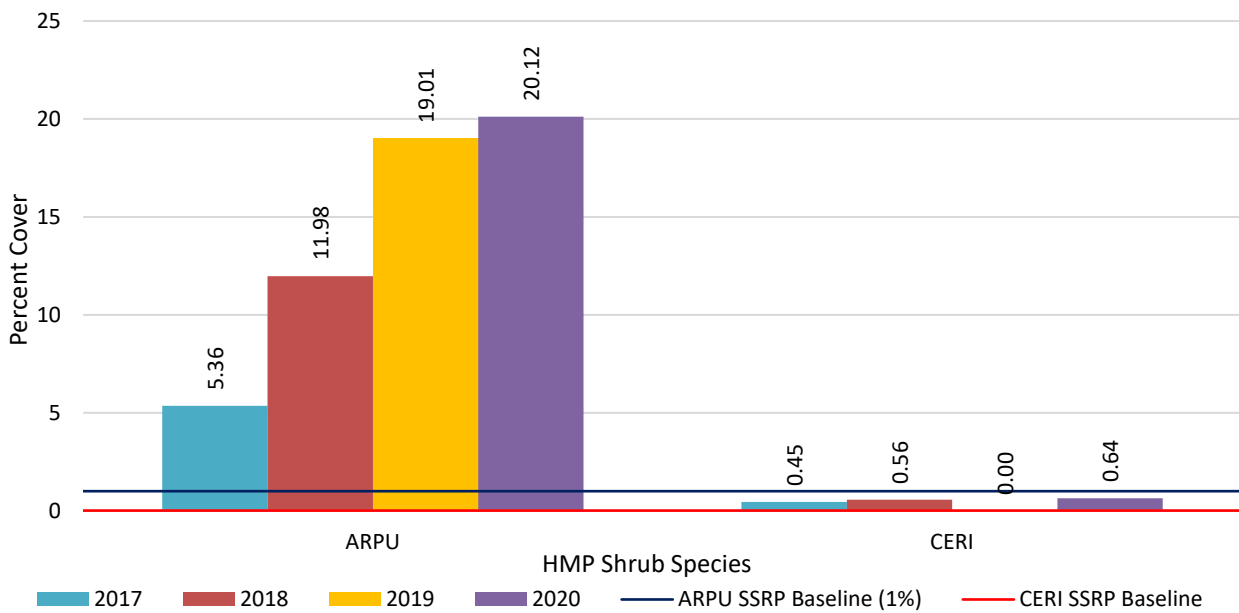


Figure 9-108. HMP Shrub Species Comparison to Success Criteria at HA 48

9.19 Austin Road Stockpile

Austin Road Stockpile encompasses about 0.45 acre 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. Broadcast seed has greater success if completed during the rainy season, November through March.

Restoration activities have not occurred at Austin Road Stockpile. Monitoring began in 2016. Austin Road Stockpile was monitored for five years by photo documentation and site visits, HMP annual density across the HA, and species richness (see Table 9-155). Figure 9-109 shows the site footprint, passive restoration area, and photo point monitoring locations. The success criteria for Austin Road Stockpile are summarized in Table 9-156.

Table 9-155. Historic Summary of Restoration and Monitoring Activities at Austin Road Stockpile

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

* Photo points and site visits occur every year regardless of the monitoring year

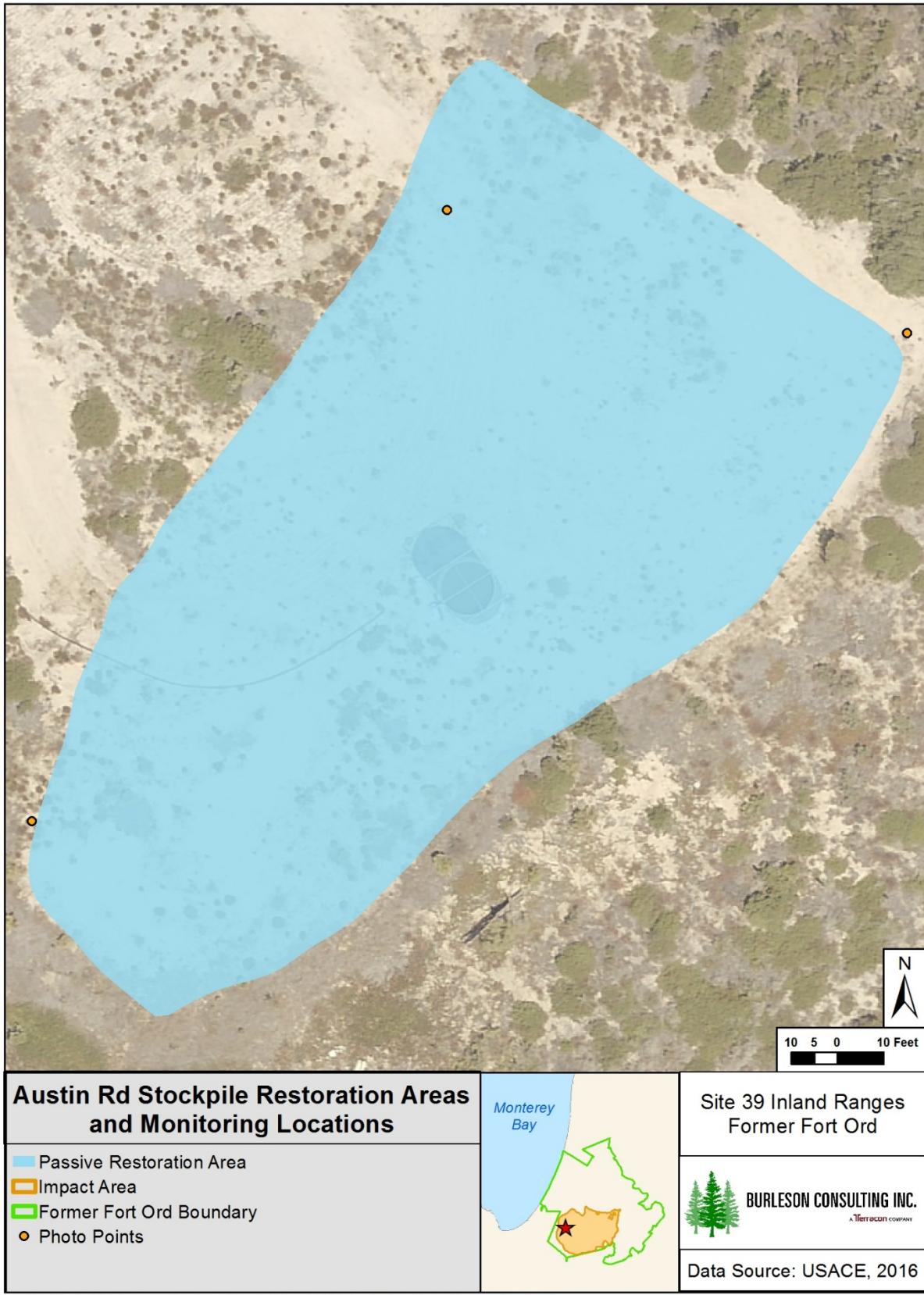


Figure 9-109. Austin Road Stockpile Restoration Areas and Monitoring Locations Map

Table 9-156. 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
		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 9-156. 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 2019.

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 five discrete patches of Monterey spineflower were mapped and individuals counted within each patch (see Figure 9-110). Densities were low and the total acreage of Monterey spineflower patches with a density at or above the SSRP baseline density class of low was 0.1 acre. From 2019 to 2020, the density range remained the same and acreage above the SSRP baseline increased.

Sand gilia was not observed at Austin Road Stockpile in 2020 but has previously been observed on site in 2017.

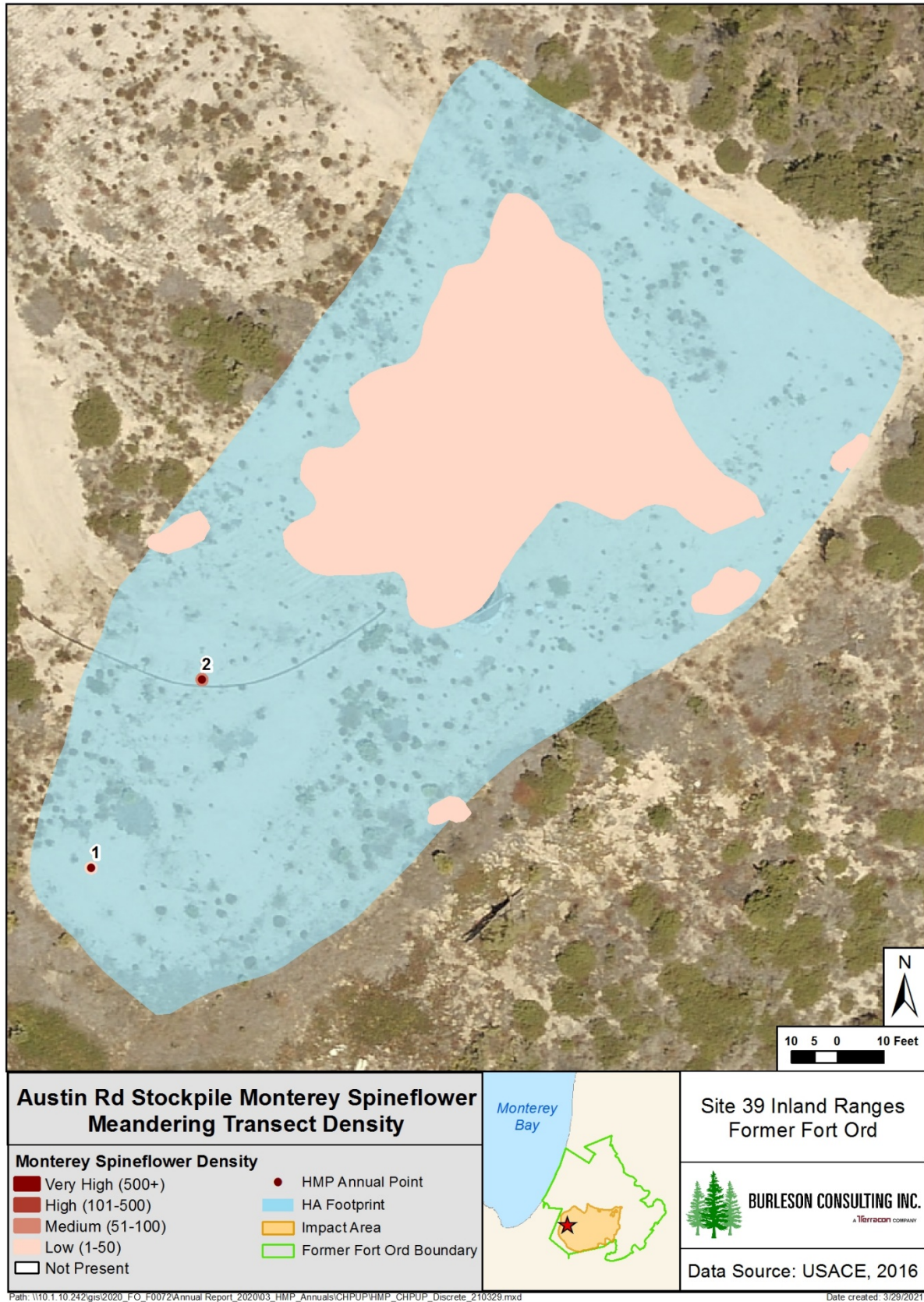


Figure 9-110. Austin Road Stockpile Monterey Spineflower Meandering Transect Density Map

9.19.2.2 Plant Survivorship

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

9.19.2.3 Species Richness

Forty-six species were observed at Austin Road Stockpile. Of those, 21 were native shrubs or perennials, eight were native annual herbaceous species, and 17 were non-native species (see Table 9-157). Species richness increased by four species since 2019. Native shrub and perennial species richness decreased by two, native herbaceous species richness increased by two, non-native species richness increased by five, and uncategorized species richness decreased by one.

Table 9-157. Species Observed at Austin Road Stockpile, 2020

Scientific Name	Common Name	Code	Category
<i>Acmispon glaber</i>	deerweed	ACGL	NP
<i>Acmispon heermannii</i> var. <i>orbicularis</i>	Heermann's lotus	ACHEO	NP
<i>Acmispon strigosus</i>	Bishop's lotus	ACST	NF
<i>Adenostoma fasciculatum</i>	chamise	ADFA	NP
<i>Aira caryophylla</i>	silver hair grass	AICA	NNF
<i>Arctostaphylos pumila</i> *	sandmat manzanita	ARPU	NP
<i>Arctostaphylos tomentosa</i>	shaggy-bark manzanita	ARTO	NP
<i>Avena barbata</i>	slender wild oat	AVBA	NNF
<i>Baccharis pilularis</i>	coyote brush	BAPI	NP
<i>Briza maxima</i>	rattlesnake grass	BRMA	NNF
<i>Bromus diandrus</i>	ripgut brome	BRDI	NNF
<i>Cardionema ramosissimum</i>	sand mat	CARA	NP
<i>Carpobrotus edulis</i>	hottentot fig	CAED	NNP
<i>Ceanothus dentatus</i>	dwarf ceanothus	CEDE	NP
<i>Centaurea melitensis</i>	totalote	CEME	NNF
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	CHPUP	NF
<i>Corethrogyne filaginifolia</i>	common sandaster	COFI	NP
<i>Crassula tillaea</i>	moss pygmy-weed	CRTI	NNF
<i>Crocanthemum scoparium</i>	peak rush-rose	CRSC	NP
<i>Diplacus aurantiacus</i>	sticky monkeyflower	DIAU	NP
<i>Ericameria ericoides</i>	mock heather	ERER	NP
<i>Eriophyllum confertiflorum</i>	golden yarrow	ERCO	NP
<i>Erodium botrys</i>	long-beaked filaree	ERBO	NNF
<i>Erodium cicutarium</i>	red-stemmed filaree	ERCI	NNF
<i>Festuca myuros</i>	rattail sixweeks grass	FEMY	NNF
<i>Gamochaeta ustulata</i>	purple cudweed	GAUS	NP
<i>Gastridium phleoides</i>	nit grass	GAPH	NNF
<i>Heterotheca grandiflora</i>	telegraph weed	HEGR	NF
<i>Horkelia cuneata</i>	wedge-leaved horkelia	HOCU	NP
<i>Hypochaeris radicata</i>	rough cat's ear	HYRA	NNP
<i>Logfia filaginoides</i>	California cottonrose	LOFI	NF
<i>Logfia gallica</i>	daggerleaf cottonrose	LOGA	NNF
<i>Lupinus albifrons</i>	silver bush lupine	LUAL	NP
<i>Lupinus chamissonis</i>	silver beach lupine	LUCH	NP
<i>Lupinus nanus</i>	sky lupine	LUNA	NF
<i>Lupinus truncatus</i>	Nuttall's annual lupine	LUTR	NF
<i>Lysimachia arvensis</i>	scarlet pimpernel	LYAR	NNF
<i>Navarretia hamata</i> ssp. <i>parviloba</i>	hooked navarretia	NAHAP	NF

Table 9-157. Species Observed at Austin Road Stockpile, 2020

Scientific Name	Common Name	Code	Category
<i>Petrorhagia dubia</i>	hairypink	PEDU	NNF
<i>Plantago erecta</i>	California plantain	PLER	NF
<i>Pseudognaphalium beneolens</i>	fragrant everlasting	PSBE	NP
<i>Pseudognaphalium ramosissimum</i>	pink everlasting	PSRA	NP
<i>Pseudognaphalium stramineum</i>	cotton-batting plant	PSST	NP
<i>Rumex acetosella</i>	sheep sorrel	RUAC	NNP
<i>Salvia mellifera</i>	black sage	SAME	NP
<i>Silene gallica</i>	small-flower catchfly	SIGA	NNF

* HMP species

9.19.2.4 Vegetative Cover

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

9.19.3 Discussion

9.19.3.1 Recommendations

Austin Road Stockpile did not receive any SSRP prescriptions activities by 2020. 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 2021 by photo documentation, HMP annual density surveys, and species richness meandering transects. Table 9-158 summarizes the current status of Austin Road Stockpile including which success criteria were met and recommendations.

Table 9-158. Status and Recommendations for Achieving Success Criteria at Austin Rd Stockpile

Success Criterion	Category	Met or Exceeded	Recommendation
Objective 1 – No. 1	Species richness	No	Wait for restoration to begin
Objective 1 – No. 2	Native vegetation cover	Cannot assess	Install transects when appropriate
Objective 2 – No. 3	Non-native target weed cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP shrub cover by species	Cannot assess	Install transects when appropriate
Objective 3 – No. 4	HMP annual density	Yes	Establishment of restoration plots not necessary

9.19.3.2 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.

9.19.3.3 Plant Survivorship

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

9.19.3.4 Species Richness

Deerweed, chamise, sandmat manzanita, shaggy-bark manzanita, coyote brush, Monterey spineflower, peak rush-rose, sticky monkeyflower, golden yarrow, mock heather, wedge-leaved horkelia, silver bush lupine, and black sage were present. Common yarrow, Hooker's manzanita, and Monterey ceanothus were not present. Austin Road Stockpile included 21 native shrub and perennial species; however, the site did not meet the success criterion for Objective 1.

9.19.3.5 Vegetative Cover

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

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, 36, 38, 39/40, 43, 44, and 48. HAs range from year 3 to year 8 for monitoring, depending on when the restoration effort took place. Historic Areas 26 and 48 were in year 5 of 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). The Army recommends corrective measures for HAs 18, 22, 23, 27, 27A, 28, 29, 33, 34, 36, 38, 39/40, and 43. Corrective measures are outlined in the recommendations 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 18, 22, 23, 33, 39/40, and 43. All sites met or exceeded baseline density requirements except for sand gilia at HA 43. Additional seed was broadcast in the sand gilia restoration plot in December 2020 and monitoring will be extended by two years to ensure the site meets the success criterion.

Overall, none of the 19 HAs 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, 17 met the species richness criterion, four met the native vegetation cover criterion, 19 met the non-native target weed cover criterion, eight met the HMP shrub cover class criterion, and two met the HMP shrub cover by species criterion. Of the 14 sites that have HMP annual criteria, twelve met the HMP annual density criterion. Table 9-159 summarizes the status of Site 39 in meeting the success criteria.

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

- HA 28 - Install additional transect in central mulched area
- HA 34 – install an additional transect in area suitable for manzanita plant installations and close the access road to restore it
- HA 39/40 – install an additional transect in Plot 3 to better assess restoration progress.
- HA 43 – conduct follow-up HMP annual density surveys for sand gilia
- HA 44 and 48 – establishment of HMP annual plots is not necessary because the species are already abundant on site.

**Table 9-159. 2020 Status for Achieving Success Criteria at Historic Areas in Former Fort Ord
Inland Ranges Site 39**

HA	Monitoring Year	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	8	No	Yes	Yes	Yes	No	Yes
19	7	No	No	Yes	Yes	No	Yes
22	8	Yes	Yes	Yes	No	No	Yes
23	8	Yes	No	Yes	Yes	No	Yes
26	5	Yes	No	Yes	No	No	Yes
27	8	Yes	No	Yes	No	No	NA
27A North	8	Yes	No	Yes	No	No	NA
27A South	8	Yes	NA	Yes	NA	NA	NA
28	6	Yes	No	Yes	Yes	No	Yes
29	8	Yes	No	Yes	No	No	NA
33	8	Yes	No	Yes	No	No	Yes
34	6	Yes	Yes	Yes	No	No	NA
36	8	Yes	No	Yes	No	No	NA
37	6	Yes	No	Yes	No	No	Yes
38	6	Yes	Yes	Yes	Yes	No	No
39/40	8	Yes	No	Yes	NA	NA	Yes
43	8	Yes	No	Yes	Yes	No	No
44	3	Yes	No	Yes	Yes	Yes	Yes
48	5	Yes	No	Yes	Yes	Yes	Yes
Austin Rd Stockpile	0	No	Cannot assess*	Cannot assess*	Cannot assess*	Cannot assess*	Yes

* 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.

10. COMMUNITY INVOLVEMENT WORKSHOP / OPEN HOUSE BUS TOUR

In addition to general restoration activities, Burleson participated in the former Fort Ord Clean-Up Open House at the Kemron Building and Bus Tour of Site 39 Inland Ranges held on February 1, 2020. Burleson was also scheduled to participate in the former Fort Ord Clean-Up Open House at the Kemron Building and Bus Tour of Site 39 Inland Ranges on July 18, 2020, but the event was cancelled due to the COVID-19 pandemic. The Open House provided an opportunity to inform members of the community about the cleanup efforts happening at former Fort Ord. Burleson personnel prepared a poster highlighting the restoration efforts within Site 39, along with a display of native seeds and plants (see Photograph C-86, Appendix C). Burleson biologists interpreted the poster and provided community engagement during the open house and bus tour.

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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 Tenth Annual Site 39 Habitat Restoration and Habitat Monitoring Meeting was held remotely on April 9, 2020 due to the COVID-19 pandemic. Participants included Chenega Support Services, USFWS, California Department of Fish and Wildlife, US Environmental Protection Agency, Department of Toxic Substances Control, USACE, BRAC, Bureau of Land Management, Fort Ord Reuse Authority, Burleson Consulting Inc., Ahtna, Arcadis, Denise Duffy & Associates, UC Santa Cruz Natural Reserves, and EcoSystems West.

Burleson presented information on Site 39 habitat restoration activities for the 2019 calendar year and the overall status of restoration progress.

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12. REFERENCES

- Baldwin BG, Goldman DH, Keil DJ, Patterson R, Rosatti TJ, and Wilken DH. 2012. The Jepson Manual: Vascular Plants of California. 2nd ed. University of California Press, Berkeley, CA. pp. 764-770.
- Bernhardt E and Swiecki T. 2019. Using Green Pears to Bait for *Phytophthora* in Soil/Root Samples. Available at: <http://phytosphere.com/soilPhytophthora/pearbaitingPhytophthora.htm>. Accessed on: January 21, 2019.
- Burleson. 2009. Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Management Plan at Former Fort Ord, California.
- Burleson. 2010. Site 39 Plant Material Collection, Storage, and Propagation Protocols for Former Fort Ord, California.
- Burleson. 2013. Site Specific Restoration Plans HAs 18, 19, 22, 23, 26, 27, 27A, 28, 29, 33, 34, 36, 37, 38, 39/40, 43, 44, 48, and Austin Road Stockpile. Former Fort Ord, California.
- Burleson. 2017. 2016 Annual Report Habitat Restoration. Former Fort Ord, California.
- Burleson. 2018. 2017 Annual Report Habitat Restoration. Former Fort Ord, California.
- Burleson. 2019a. 2018 Annual Report Habitat Restoration. Former Fort Ord, California.
- Burleson. 2019b. Final Accident Prevention Plan Habitat Restoration and Habitat Monitoring, Former Fort Ord, California.
- Calflora Database. 2017. Berkeley, California. <http://www.calflora.org/>
- California Data Exchange Center, California Department of Water Resources (CDEC). 2020. Daily incremental precipitation, Monterey airport (MTY) station. National Weather Service. Available at: <http://cdec.water.ca.gov/cdecstation2/>. Accessed on: December 10, 2020.
- Kemron. 2018. 2017 Annual Biological Monitoring Report. Former Fort Ord, California.
- Mactec. 2008. Feasibility Study Addendum Site 39 Inland Ranges, Former Fort Ord, California.
- Matthews MA, Mitchell M. 2015. The Plants of Monterey County, an Illustrated Field Key. 2nd ed. California Native Plant Society Press, Sacramento, CA. pp. 165-167.
- Shaw Environmental (Shaw). 2008. Final Feasibility Study Addendum, Site 39 Inland Ranges, Former Fort Ord, California.
- Shaw. 2009a. Annual Biological Monitoring Report, 2008, Former Fort Ord, California.
- Shaw. 2009b. Final Habitat Restoration Plan Site 39 Inland Ranges Former Fort Ord, California. U.S. Army Corps of Engineers, Sacramento District, 1992. Flora and fauna baseline study of Fort Ord, California. November. Technical assistance from Jones & Stokes Associates, Inc. Sacramento, CA.

- U.S. Army Corps of Engineers (USACE), Sacramento District. 1992. Flora and Fauna Baseline Study of Fort Ord, California. November. Technical assistance from Jones & Stokes Associates, Inc. Sacramento, CA. Record Number BW-1938.
- U.S. Fish and Wildlife Service (USFWS). 2017. Requested Changes to Habitat Restoration Success Criteria Under the Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (2017-F-0094).
- U.S. Fish and Wildlife Service (USFWS). 2019. Requested Changes to Habitat Restoration Success Criteria for HA 27A Under the Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (2017-F-0094).
- U.S. Fish and Wildlife Service (USFWS). 2020. Request for Changes to the Habitat Restoration Criteria at HA 34 Under the Programmatic Biological Opinion for Cleanup and Property Transfer Actions Conducted at the Former Fort Ord, Monterey County, California (2017-F-0094).
- U.S. Forest Service (USFS). 2007. Ecological Subregions of California 261AH Region 5, Pacific Southwest Region, Vallejo, CA. <http://www.fs.fed.us/r5/projects/ecoregions/261ah.htm>.

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)
<i>Artemesia californica</i>	California sagebrush	-	1.25	1.25
<i>Baccharis pilularis</i>	coyote brush	-	0.57	0.57
<i>Ceanothus rigidus</i> *	Monterey ceanothus	26	1.00	1.00
<i>Ceanothus rigidus</i> *	Monterey ceanothus	34	1.25	1.25
<i>Ceanothus rigidus</i> *	Monterey ceanothus	37	0.80	0.80
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	26	0.21	0.21
<i>Chorizanthe pungens</i> var. <i>pungens</i> *	Monterey spineflower	37	1.04	1.04
<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i> *	seaside bird's beak	38	0.15	0.15
<i>Crocanthemum scoparium</i>	peak rush-rose	-	2.65	2.65
<i>Diplacus aurantiacus</i>	sticky monkey flower	-	0.75	0.75
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	26	0.10	0.10
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	37	0.16	0.16
<i>Eriophyllum confertiflorum</i>	golden yarrow	-	2.38	2.38
<i>Frangula californica</i>	California coffeeberry	-	0.15	0.15
<i>Garrya elliptica</i>	coast silk tassel	-	0.95	0.95
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	38	0.075	0.058
<i>Gilia tenuiflora</i> ssp. <i>arenaria</i> *	sand gilia	43	0.001	0.001
<i>Lupinus arboreus</i>	yellow bush lupine	-	1.25	1.25
<i>Lupinus chamissonis</i>	silver beach lupine	-	0.60	0.60
<i>Lupinus nanus</i>	sky lupine	-	1.02	1.02
<i>Salvia mellifera</i>	black sage	-	3.85	3.85
TOTAL			20.206	20.189

* HMP species

Table A-2. Production Seed Targets and Inventory

Scientific Name	Common Name	HA	Target Amount (lb)	Inventory (lb)*
<i>Achillea millefolium</i>	common yarrow	-	6.10	49.50
<i>Acmispon glaber</i>	deerweed	-	11.15	52.00
<i>Elymus glaucus</i>	blue wildrye	-	21.65	478.00
<i>Hordeum</i> sp.	sterile barley	-	30.50	1.10
<i>Horkelia cuneata</i>	wedge-leaved horkelia	-	12.10	0.00
<i>Stipa pulchra</i>	purple needlegrass	-	13.20	0.00
TOTAL			94.70	580.60

*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
<i>Acmispon glaber</i>	deerweed	10/2/2020	64.93	68.00	29.22	69,364

Table A-4. Plant Propagation Inventory

Scientific Name	Common Name	HA 26 (# individuals)	HA 34 (# individuals)	HA 37 (# individuals)
<i>Achillea millefolium</i>	common yarrow	125	55	80
<i>Acmispon glaber</i>	deerweed	175	275	100
<i>Adenostoma fasciculata</i> †	chamise	134	74	159
<i>Arctostaphylos pumila</i> *†	sandmat manzanita	125	-	80
<i>Arctostaphylos hookeri</i> *†	Hooker's manzanita	-	74	60
<i>Arctostaphylos montereyensis</i> *†	Monterey manzanita	-	74	100
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i> †	shaggy-bark manzanita	138	74	279
<i>Artemisia californica</i>	California sagebrush	-	92	-
<i>Baccharis pilularis</i>	coyote brush	61	92	80
<i>Ceanothus rigidus</i> *	Monterey ceanothus	125	92	100
<i>Crocanthemum scoparium</i>	peak rush-rose	200	275	100
<i>Diplacus aurantiacus</i>	sticky monkey flower	125	183	100
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	100	-	-
<i>Eriophyllum confertiflorum</i>	golden yarrow	100	147	80
<i>Garrya elliptica</i>	coast silk tassel	-	-	80
<i>Horkelia cuneata</i>	wedge-leaved horkelia	175	275	100
<i>Lupinus arboreus</i>	yellow bush lupine	15	92	100
<i>Lupinus chamissonis</i>	silver beach lupine	-	-	100
<i>Salvia mellifera</i>	black sage	125	147	120
TOTAL		1,723	2,021	1,818

* HMP species

† Species propagated via cuttings

Table A-5. Adaptive Management Plan Plant Propagation Inventory

Scientific Name	Common Name	HA 27A North (# individuals)	HA 27A South (# individuals)	HA 29 (# individuals)	HA 38 (# individuals)	HA 39/40 (# individuals)
<i>Acmispon glaber</i>	deerweed	-	100	-	-	-
<i>Arctostaphylos pumila</i> *†	sandmat manzanita	160	-	180	-	-
<i>Arctostaphylos hookeri</i> *†	Hooker's manzanita	-	-	60	-	-
<i>Arctostaphylos montereyensis</i> *†	Monterey manzanita	-	-	60	-	-
<i>Baccharis pilularis</i>	coyote brush	-	100	-	-	200
<i>Carex</i> sp.‡	sedge	-	-	-	-	100
<i>Ceanothus rigidus</i> *	Monterey ceanothus	40	-	60	40	-
<i>Distichlis spicata</i> ‡	salt grass	-	-	-	-	100
<i>Ericameria fasciculata</i> *	Eastwood's goldenbush	-	-	60	-	-
<i>Juncus</i> sp.‡	rush	-	-	-	-	100
<i>Lupinus arboreus</i>	yellow bush lupine	-	-	-	-	100
<i>Stipa pulchra</i>	purple needle grass	-	100	-	-	100
TOTAL		200	300	420	40	700

* HMP species

† Species propagated via cuttings

‡ Plant material is salvaged and planted directly on site

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APPENDIX B

Restoration Activities

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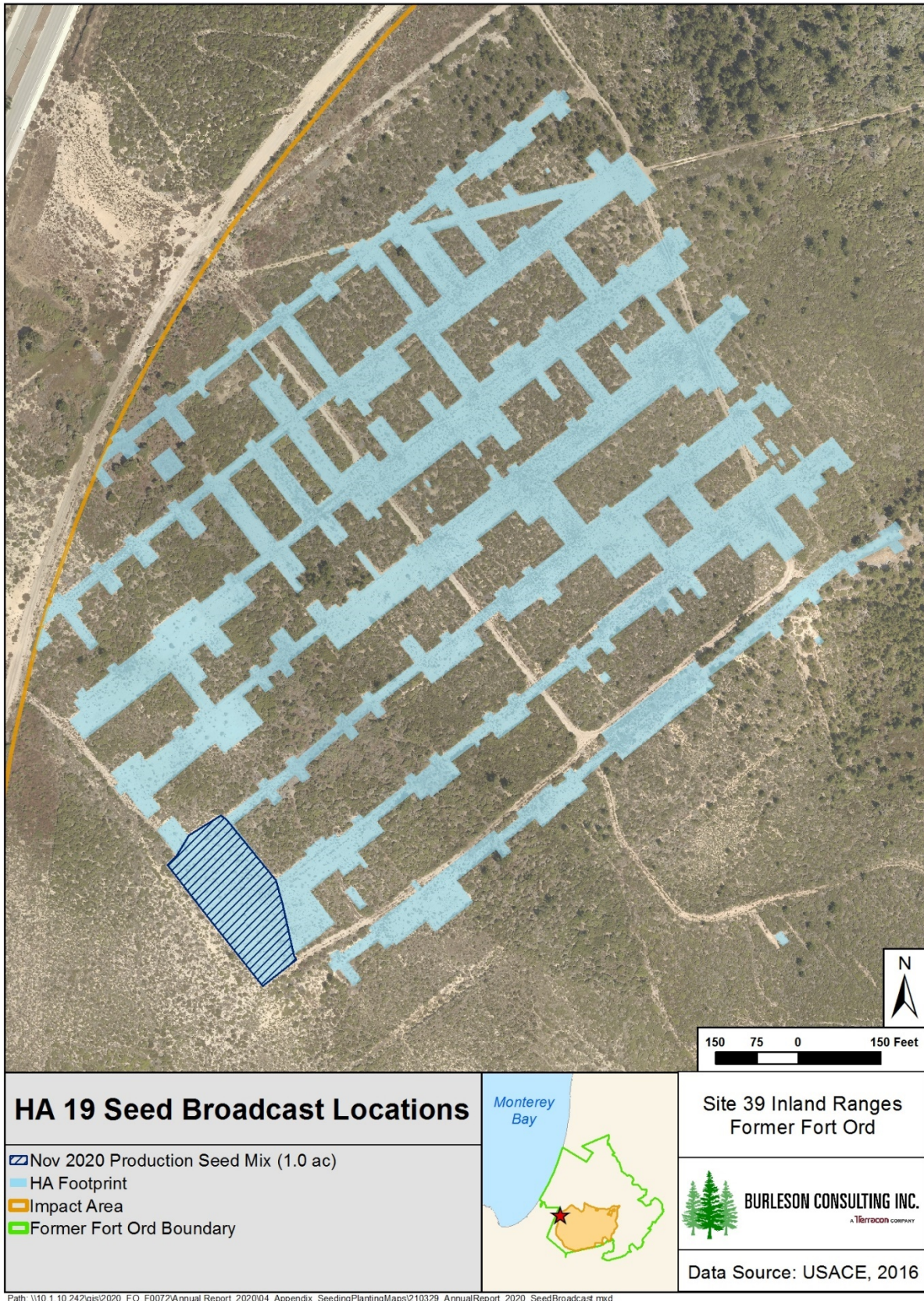


Figure B-1. HA 19 Seed Broadcast Locations, Former Fort Ord

Table B-1. HA 19 Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	8.0
<i>Acmispon glaber</i> (deerweed)	8.0
<i>Elymus glaucus</i> (blue wild-rye)	12.0
TOTAL	28.0

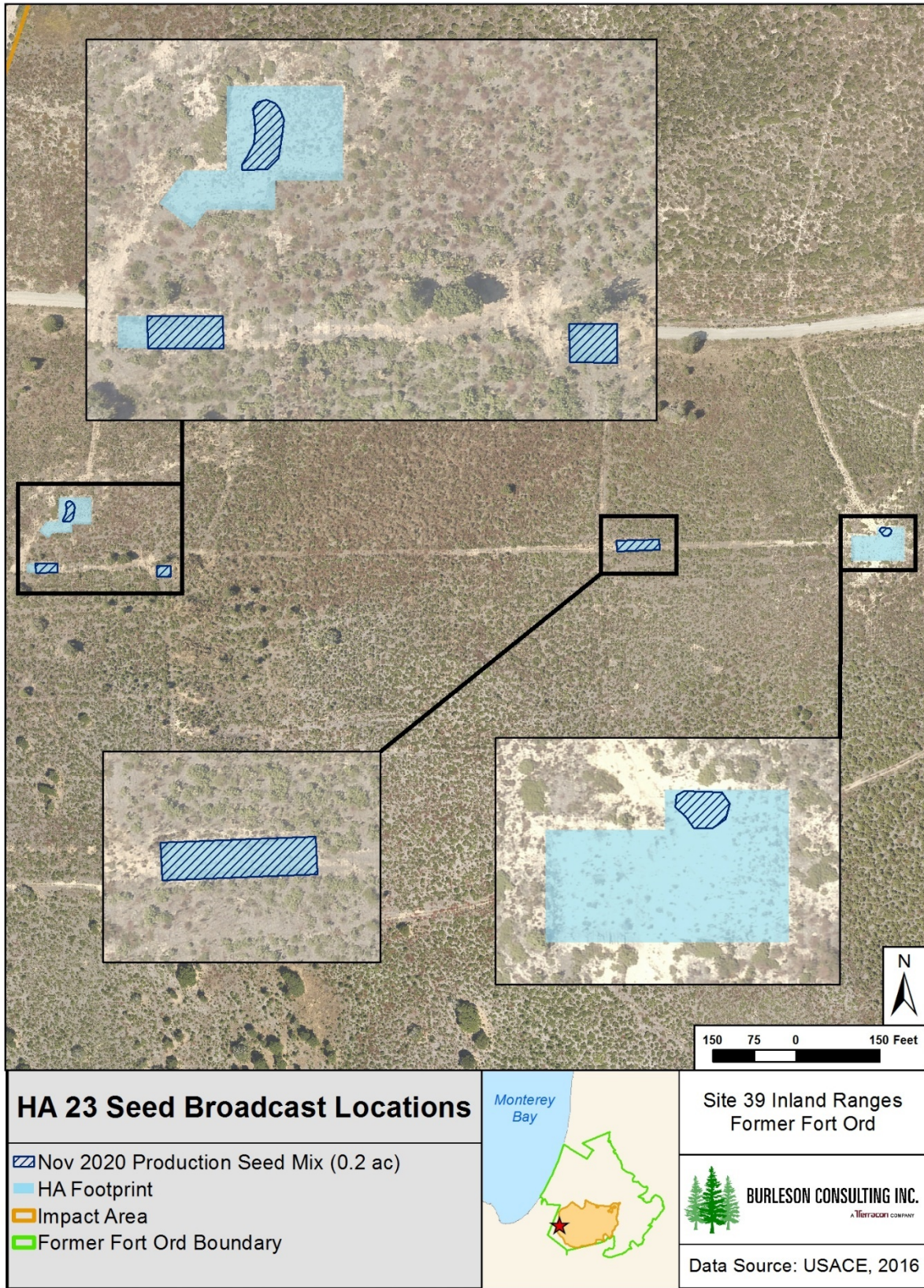


Figure B-2. HA 23 Seed Broadcast Locations, Former Fort Ord

Table B-2. HA 23 Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	1.6
<i>Acmispon glaber</i> (deerweed)	1.6
<i>Elymus glaucus</i> (blue wild-rye)	2.4
TOTAL	5.6

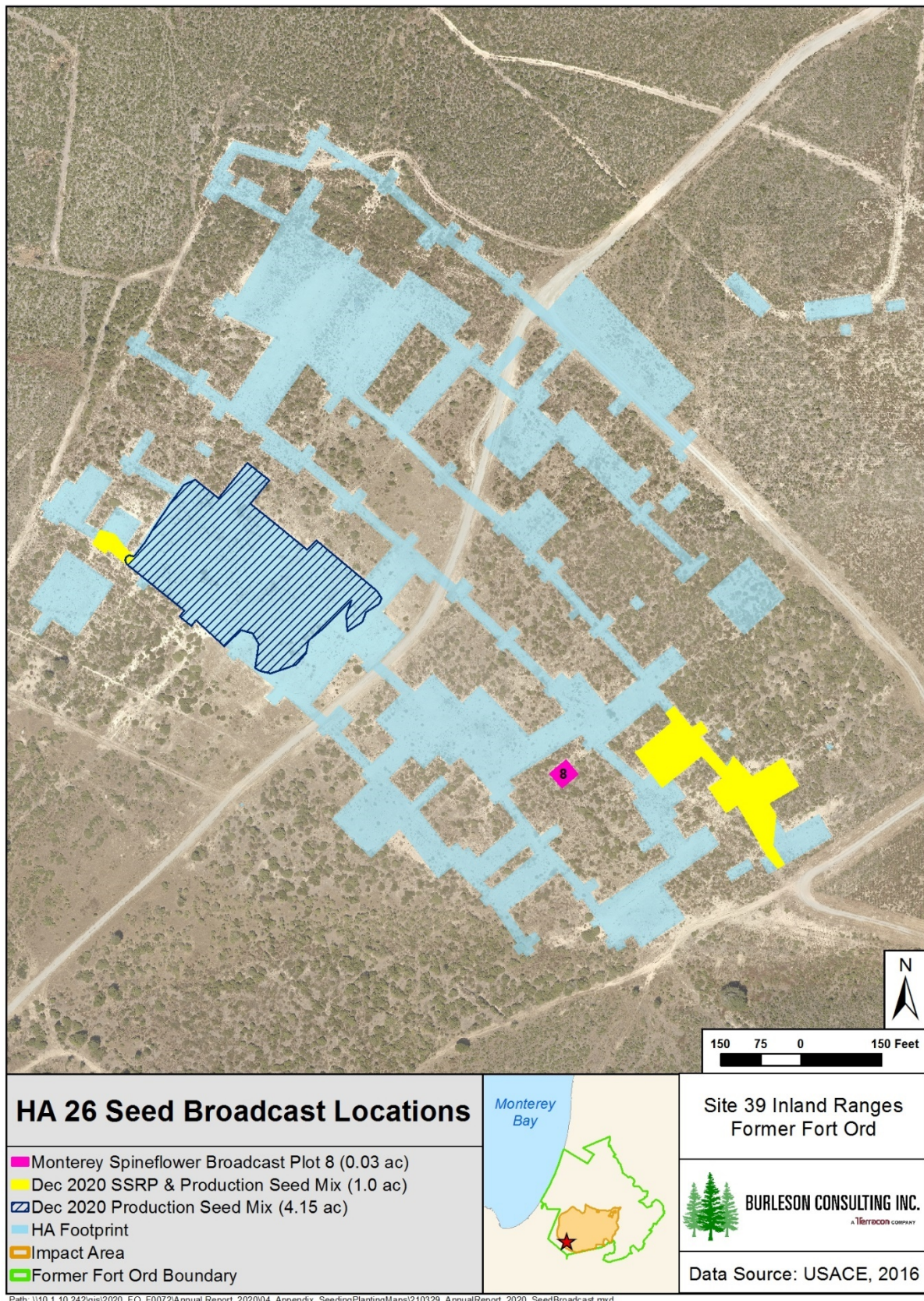


Figure B-3. HA 26 Seed Broadcast Locations, Former Fort Ord

Table B-3. HA 26 SSRP Seed Mix Enhanced with Production Seed (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> † (common yarrow)	4.0
<i>Acemison glaber</i> † (deerweed)	10.0
<i>Baccharis pilularis</i> (coyote brush)	0.2
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	1.0
<i>Crocanthemum scoparium</i> (peak rush-rose)	0.8
<i>Diplacus aurantiacus</i> (sticky monkeyflower)	0.5
<i>Elymus glaucus</i> † (blue wild-rye)	16.0
<i>Ericameria fasciculata</i> * (Eastwood's golden fleece)	0.1
<i>Eriophyllum confertiflorum</i> (golden yarrow)	1.0
<i>Frangula californica</i> (California coffeeberry)	0.15
<i>Garrya elliptica</i> (coast silk tassel)	0.15
<i>Hordeum</i> sp. (sterile barley)	20.0
<i>Salvia mellifera</i> (black sage)	1.0
TOTAL	54.9

*HMP species

†production seed

Table B-4. HA 26 Production Seed Mix (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	33.2
<i>Acmispon glaber</i> (deerweed)	33.2
<i>Elymus glaucus</i> (blue wild-rye)	49.8
TOTAL	116.2

Table B-5. HA 26 Monterey Spineflower Seed Broadcast

Plot Name	Plot ID	Plot Area (ft²)	Date Broadcast	Amount (lb)
8	HA26_CHPUP_08	1,302	Dec 2020	0.21
TOTAL				0.21



Figure B-4. HA 27 Seed Broadcast Locations, Former Fort Ord

Table B-6. HA 27 Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	0.4
<i>Acmispon glaber</i> (deerweed)	0.4
<i>Elymus glaucus</i> (blue wild-rye)	0.6
TOTAL	1.4

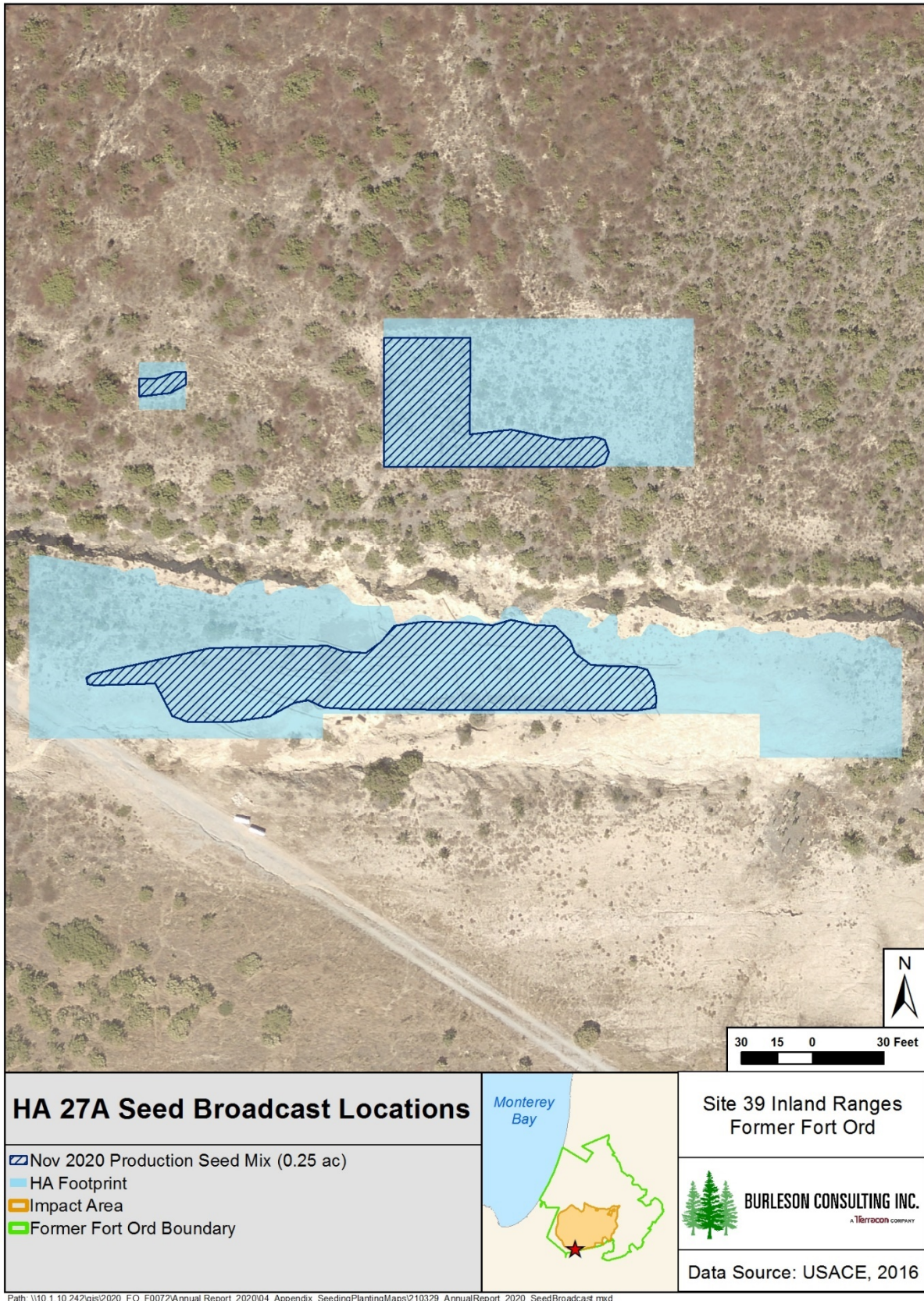


Figure B-5. HA 27A Seed Broadcast Locations, Former Fort Ord

Table B-7. HA 27A Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	2.0
<i>Acmispon glaber</i> (deerweed)	2.0
TOTAL	4.0

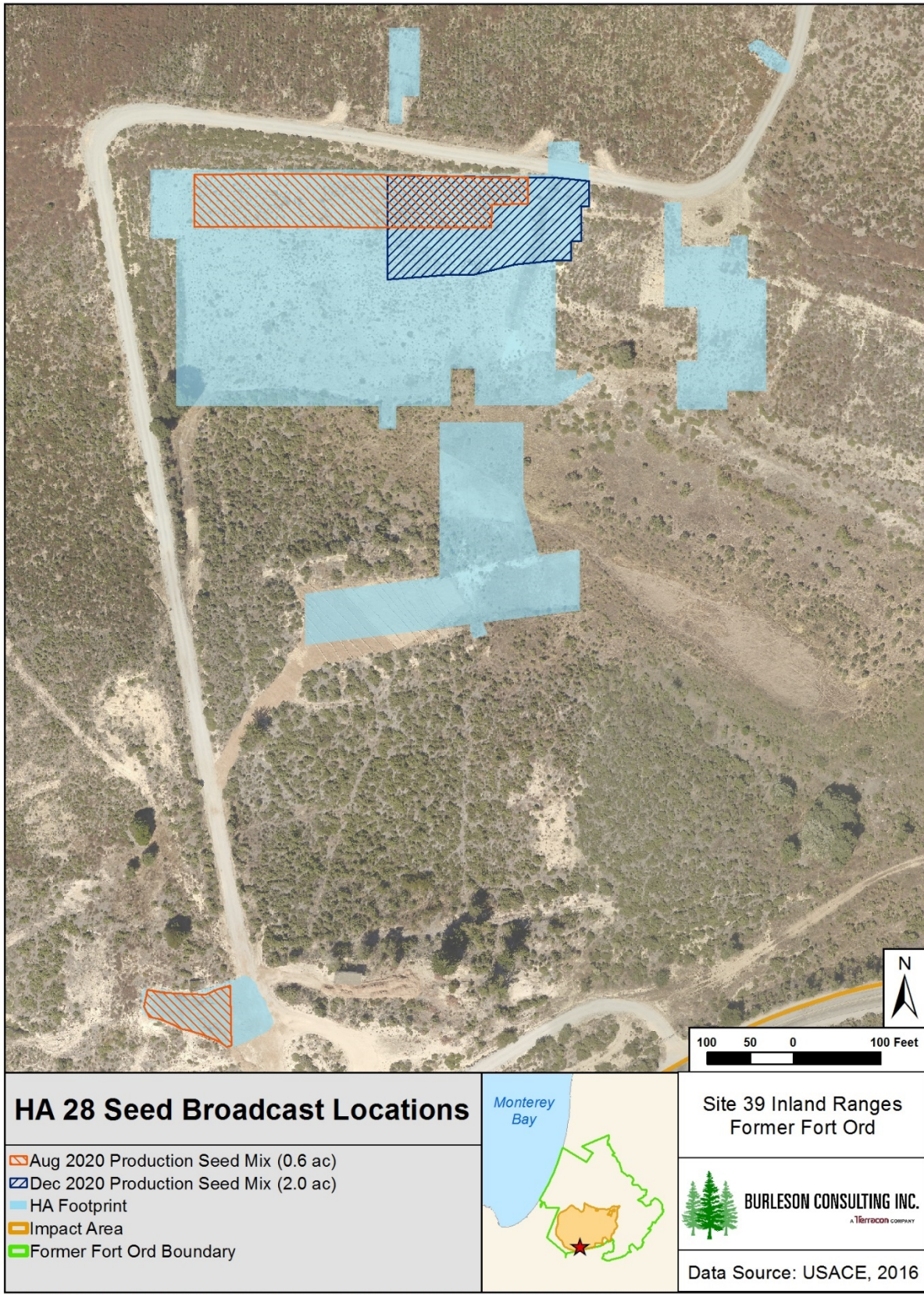


Figure B-6. HA 28 Seed Broadcast Locations, Former Fort Ord

Table B-8. HA 28 Production Seed Mix (Aug - Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	17.2
<i>Acmispon glaber</i> (deerweed)	18.4
<i>Elymus glaucus</i> (blue wild-rye)	3.0
<i>Stipa pulchra</i> (purple needle grass)	0.9
TOTAL	39.5

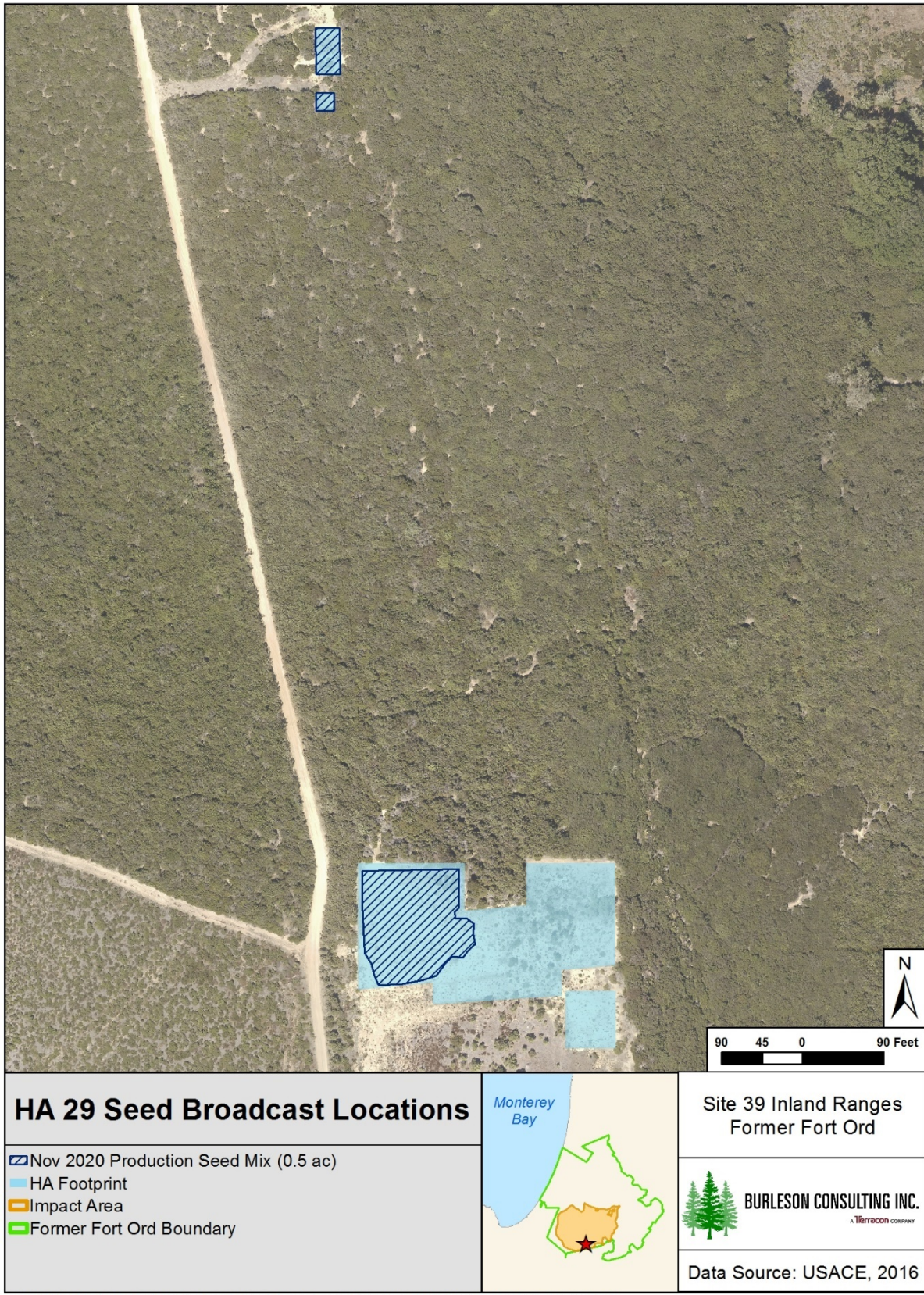


Figure B-7. HA 29 Seed Broadcast Location, Former Fort Ord.

Table B-9. HA 29 Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	4.0
<i>Acmispon glaber</i> (deerweed)	4.0
TOTAL	8.0

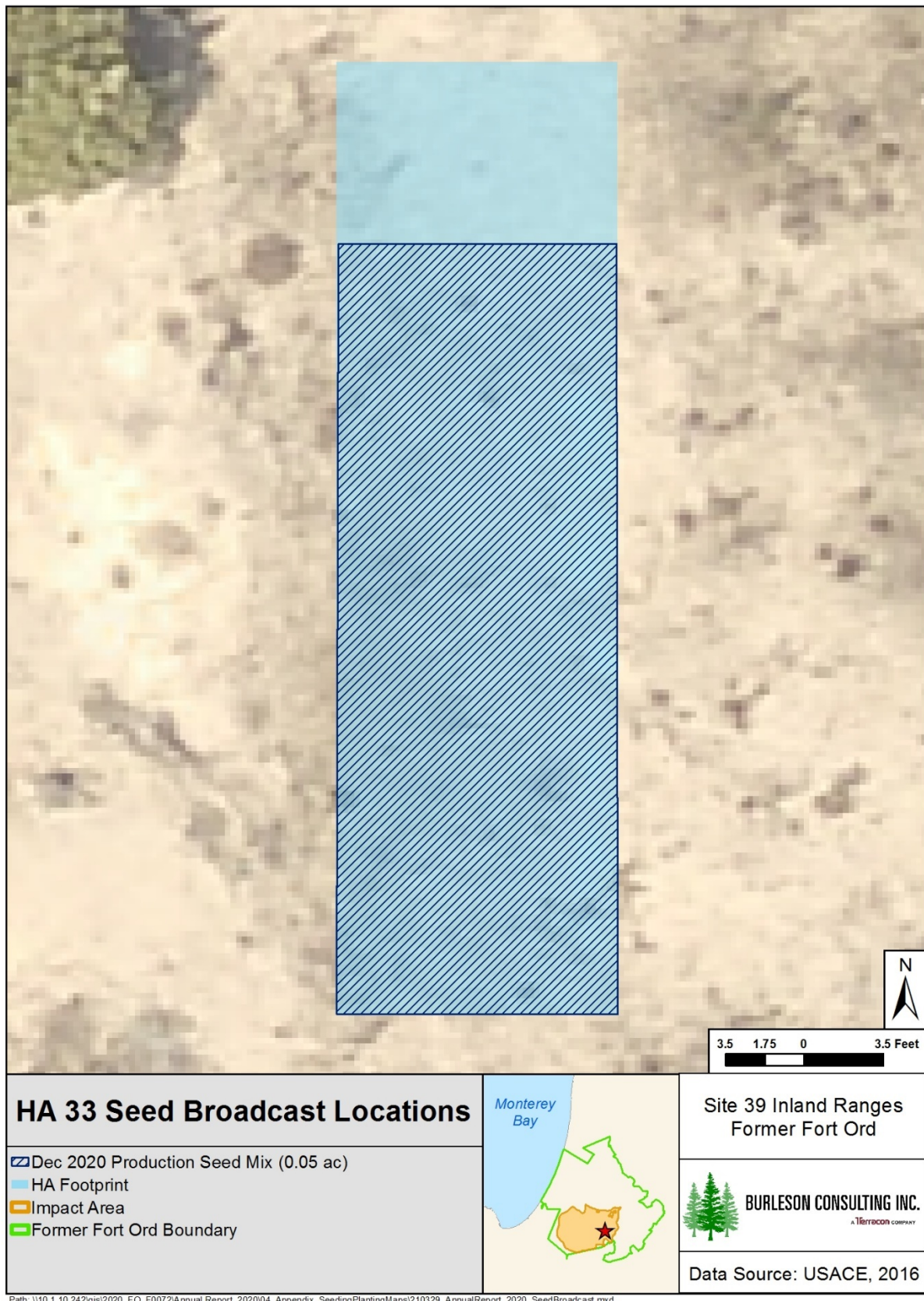


Figure B-8. HA 33 Seed Broadcast Location, Former Fort Ord.

Table B-10. HA 33 Production Seed Mix (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	0.4
<i>Acmispon glaber</i> (deerweed)	0.4
TOTAL	0.8

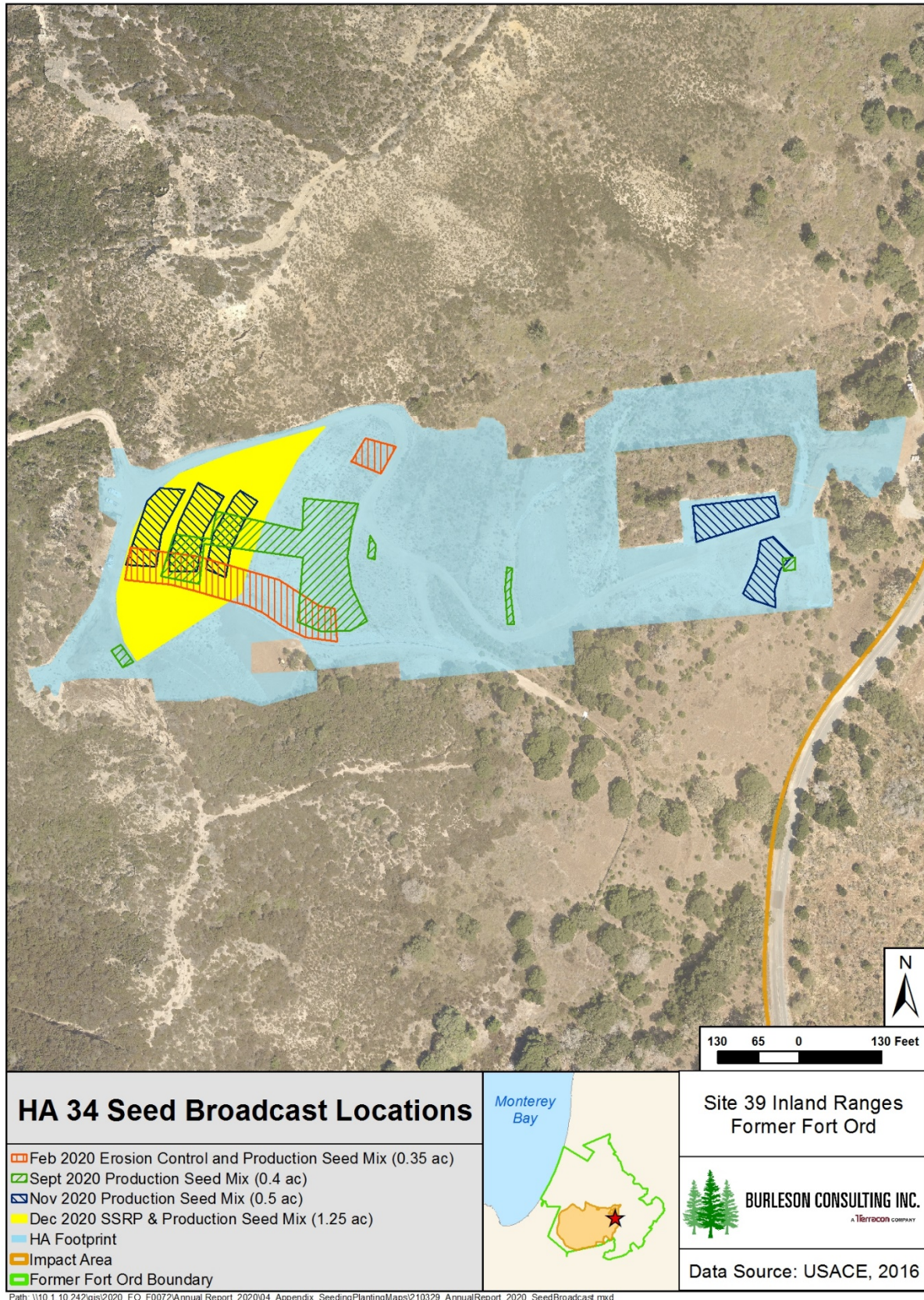


Figure B-9. HA 34 Seed Broadcast Locations, Former Fort Ord

Table B-11. HA 34 SSRP Seed Mix Enhanced with Production Seed (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> [†] (common yarrow)	5.0
<i>Acmispon glaber</i> [†] (deerweed)	7.5
<i>Artemisia californica</i> (California sagebrush)	1.25
<i>Baccharis pilularis</i> (coyote brush)	0.25
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	1.25
<i>Crocanthemum scoparium</i> (peak rush-rose)	1.25
<i>Diplacus aurantiacus</i> (sticky monkeyflower)	0.13
<i>Elymus glaucus</i> [†] (blue wild-rye)	22.5
<i>Eriophyllum confertiflorum</i> (golden yarrow)	0.38
<i>Hordeum</i> sp. (sterile barley)	12.5
<i>Lupinus arboreus</i> (yellow bush lupine)	1.25
<i>Salvia mellifera</i> (black sage)	1.25
TOTAL	54.51

*HMP species

†production seed

Table B-12. HA 34 Erosion Control Seed Mix (Feb 2020)

Species	Amount (lb)
<i>Elymus glaucus</i> (blue wild-rye)	2.0
<i>Hordeum</i> sp. (sterile barley)	3.0
<i>Stipa pulchra</i> (purple needle grass)	1.25
TOTAL	6.25

Table B-13. HA 34 Production Seed Mix (Feb – Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	5.0
<i>Acmispon glaber</i> (deerweed)	6.0
<i>Elymus glaucus</i> (blue wild-rye)	8.5
<i>Stipa pulchra</i> (purple needle grass)	1.1
TOTAL	20.6

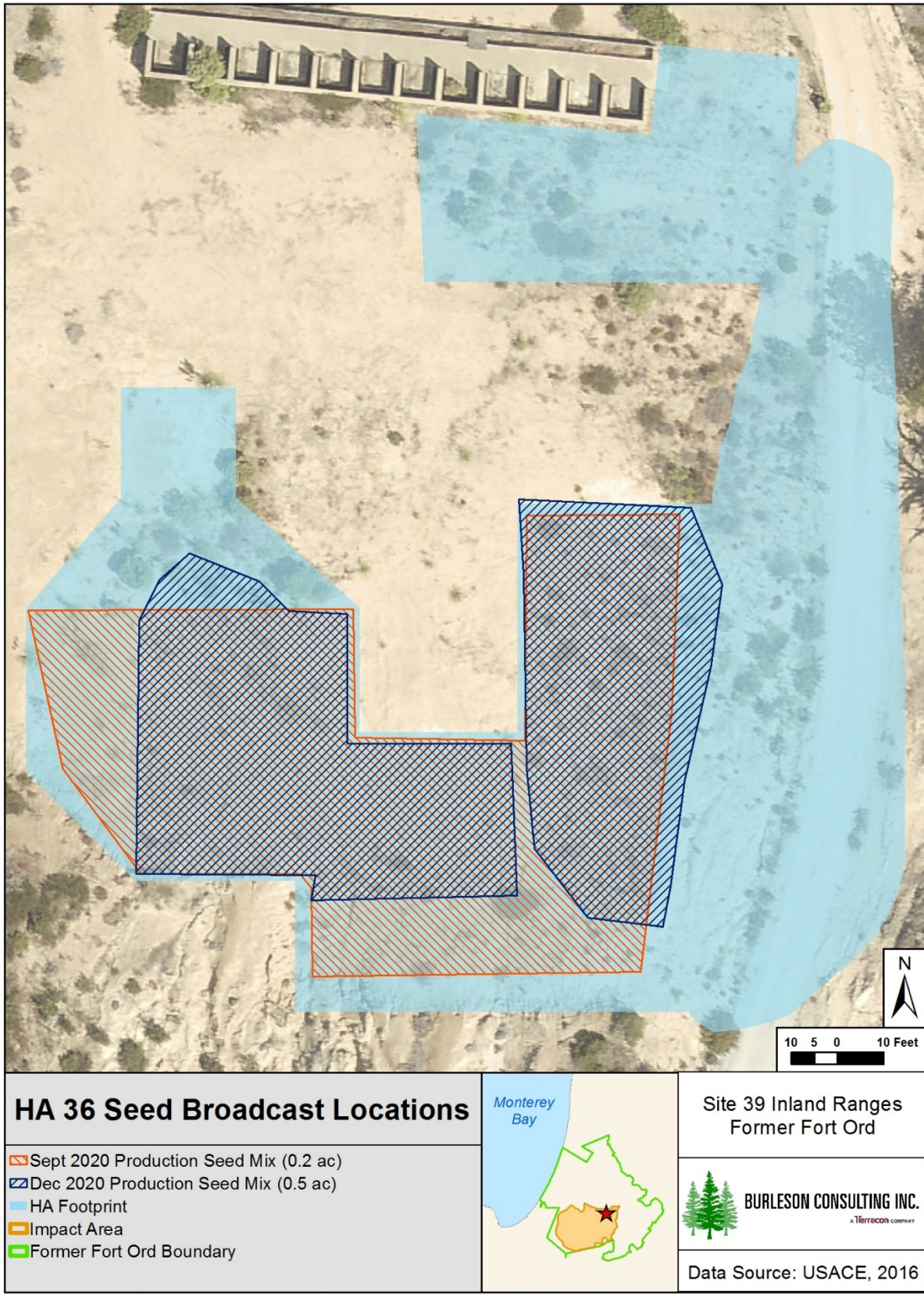


Figure B-10. HA 36 Seed Broadcast Locations, Former Fort Ord

Table B-14. HA 36 Production Seed Mix (Sept - Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	4.4
<i>Acmispon glaber</i> (deerweed)	4.8
<i>Elymus glaucus</i> (blue wild-rye)	1.0
<i>Stipa pulchra</i> (purple needle grass)	0.3
TOTAL	10.5

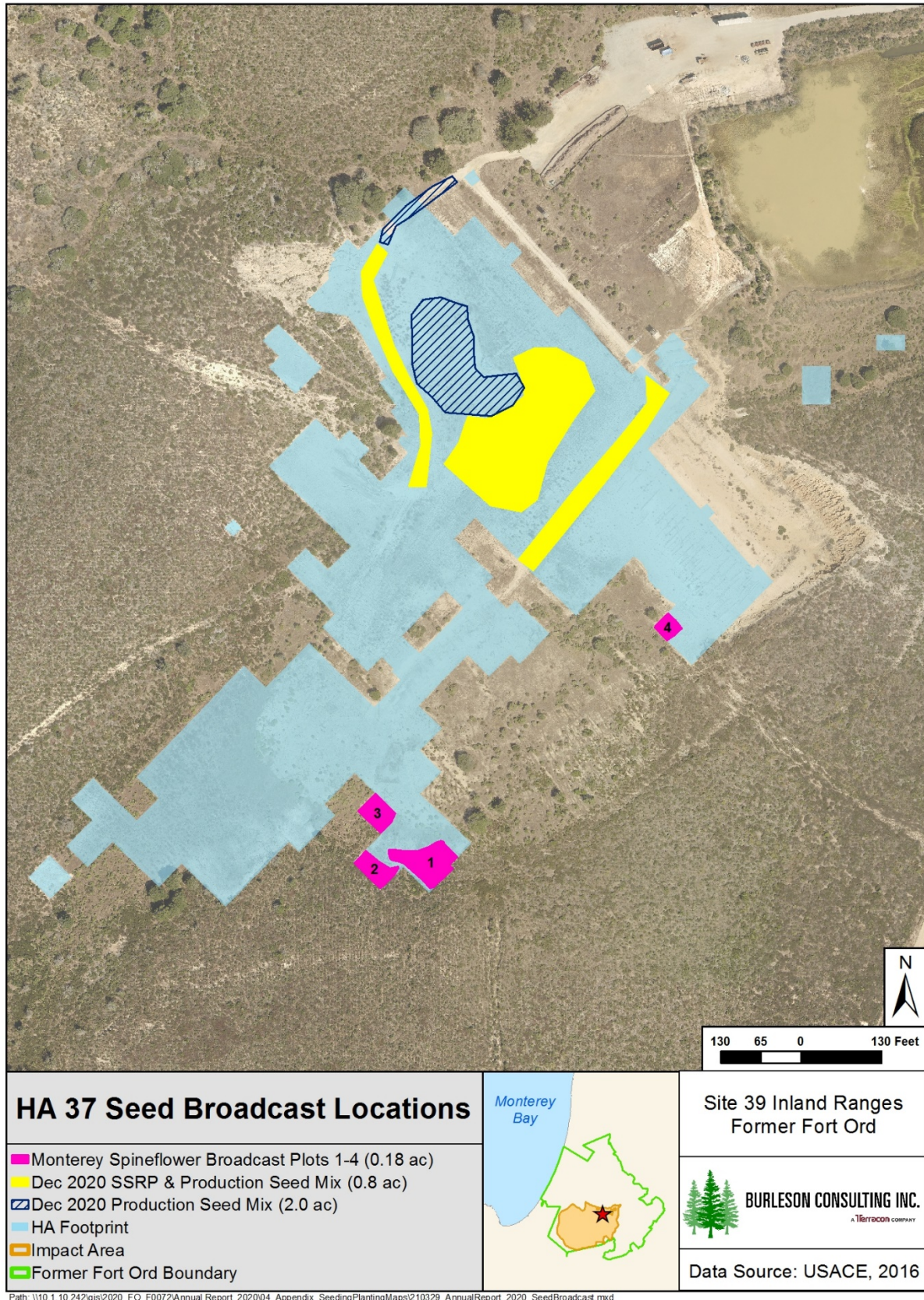


Figure B-11. HA 37 Seed Broadcast Locations, Former Fort Ord

Table B-15. HA 37 SSRP Seed Mix Enhanced with Production Seed (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> [†] (common yarrow)	1.6
<i>Acmispon glaber</i> [†] (deerweed)	4.8
<i>Baccharis pilularis</i> (coyote brush)	0.12
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	0.8
<i>Crocanthemum scoparium</i> (peak rush-rose)	0.6
<i>Diplacus aurantiacus</i> (sticky monkeyflower)	0.12
<i>Elymus glaucus</i> [†] (blue wild-rye)	4.8
<i>Ericameria fasciculata</i> * (Eastwood's golden fleece)	0.16
<i>Eriophyllum confertiflorum</i> (golden yarrow)	1.0
<i>Hordeum sp.</i> [†] (sterile barley)	8.0
<i>Lupinus chamissonis</i> (silver beach lupine)	0.6
<i>Lupinus nanus</i> (sky lupine)	1.02
<i>Salvia mellifera</i> (black sage)	1.6
TOTAL	25.22

*HMP species

†production seed

Table B-16. HA 37 Production Seed Mix (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	16.0
<i>Acmispon glaber</i> (deerweed)	16.0
<i>Elymus glaucus</i> (blue wild-rye)	24.0
TOTAL	56.0

Table B-17. HA 37 Monterey Spineflower Seed Broadcast

Plot Name	Plot ID	Plot Area (ft²)	Date Broadcast	Amount (lb)
1	HA37_CHPUP_01	4,253	Dec 2020	0.26
2	HA37_CHPUP_02	1,914	Dec 2020	0.26
3	HA37_CHPUP_03	1,980	Dec 2020	0.26
4	HA37_CHPUP_04	1,040	Dec 2020	0.26
TOTAL				1.04

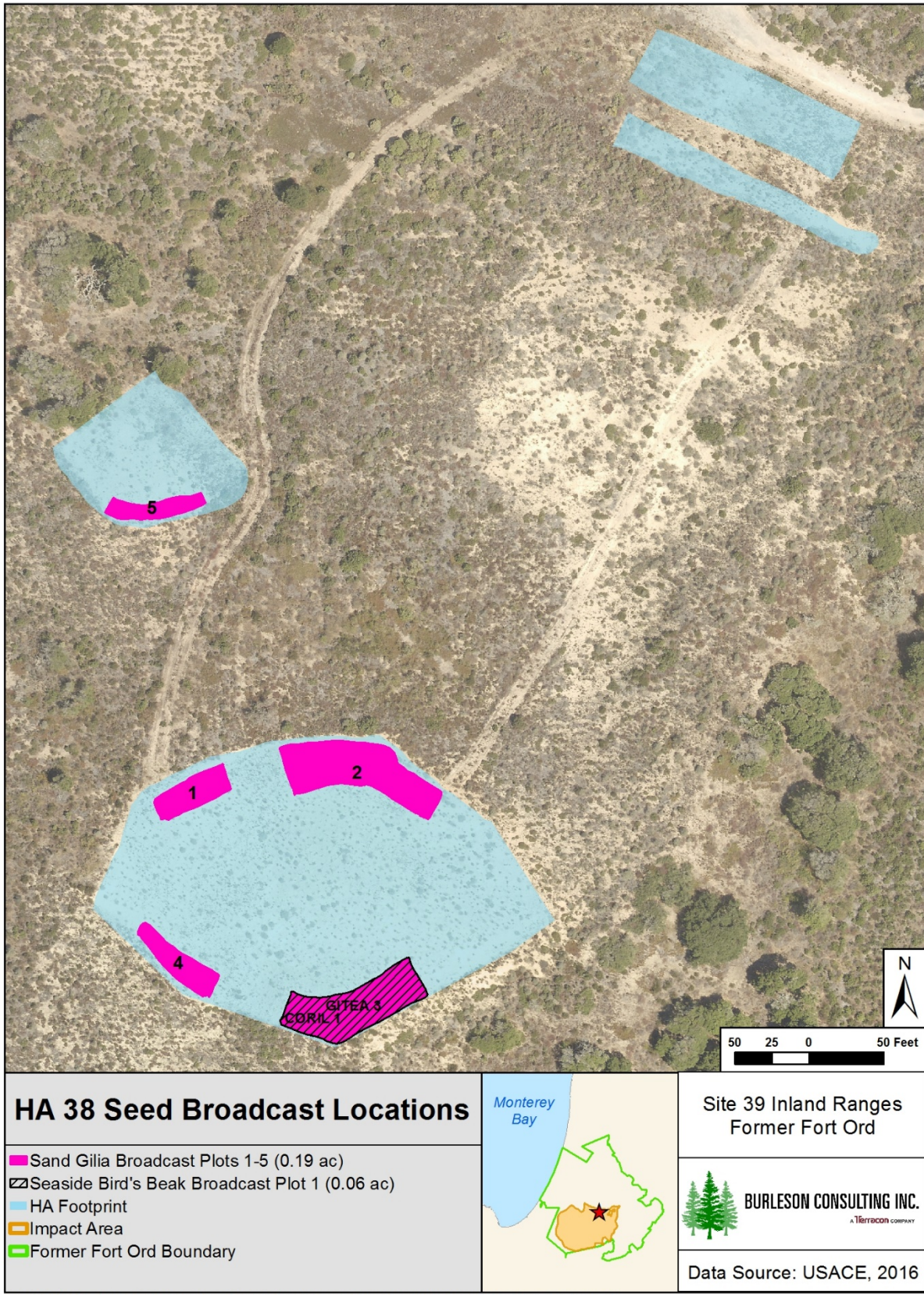


Figure B-12. HA 38 Seed Broadcast Location, Former Fort Ord.

Table B-18. HA 38 Sand Gilia Seed Broadcast

Plot Name	Plot ID	Plot Area (ft ²)	Date Broadcast	Amount (lb)
1	HA38_GITEA_01	939	Dec 2020	0.012
2	HA38_GITEA_02	2,922	Dec 2020	0.012
3	HA38_GITEA_03	2,639	Dec 2020	0.012
4	HA38_GITEA_04	910	Dec 2020	0.012
5	HA38_GITEA_05	672	Dec 2020	0.012
TOTAL				0.058

Table B-19. HA 38 Seaside Bird's Beak Seed Broadcast

Plot Name	Plot ID	Plot Area (ft ²)	Date Broadcast	Amount (lb)
1	HA38_CORIL_01	2,922	Dec 2020	0.15
TOTAL				0.15

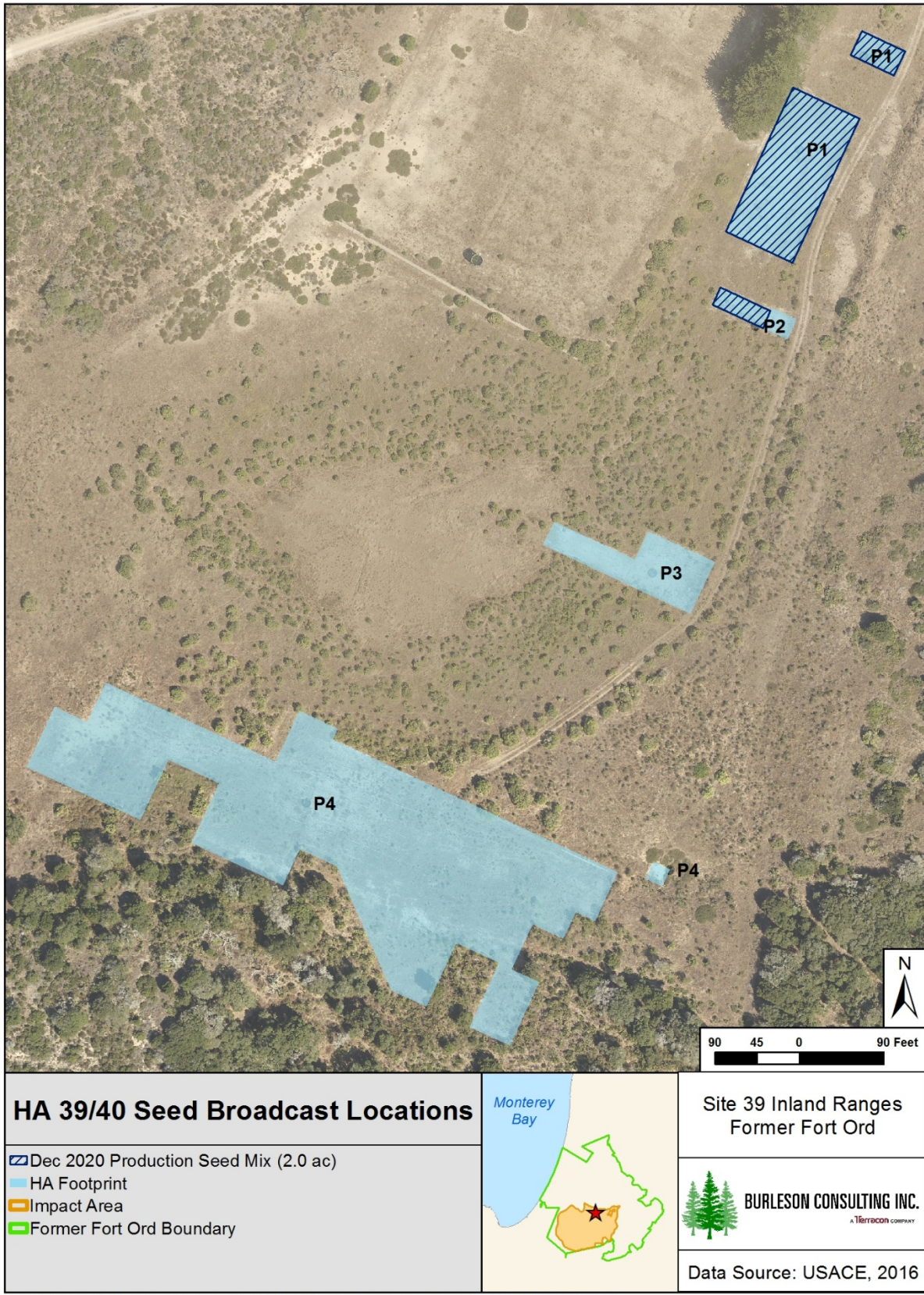


Figure B-13. HA 39/40 Seed Broadcast Location, Former Fort Ord.

Table B-20. HA 39/40 Production Seed Mix (Dec 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	16.0
<i>Acmispon glaber</i> (deerweed)	16.0
<i>Elymus glaucus</i> (blue wild-rye)	24.0
<i>Stipa pulchra</i> (purple needle grass)	10.0
TOTAL	66.0

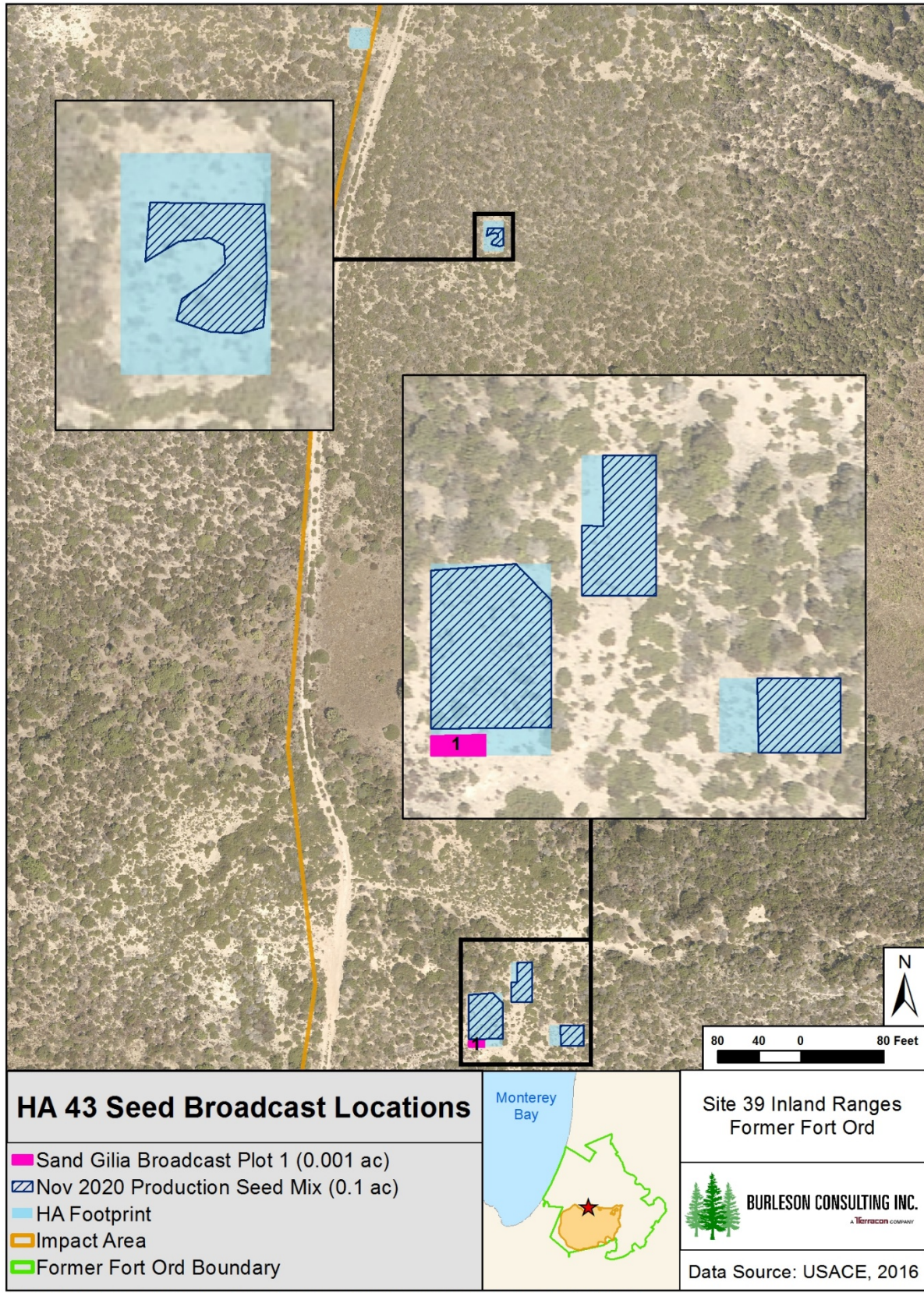


Figure B-14. HA 43 Seed Broadcast Location, Former Fort Ord.

Table B-21. HA 43 Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	0.8
<i>Acmispon glaber</i> (deerweed)	0.8
TOTAL	1.6

Table B-22. HA 43 Sand Gilia Seed Broadcast

Plot Name	Plot ID	Plot Area (ft²)	Date Broadcast	Amount (lb)
1	HA43_GITEA_01	81	Dec 2020	0.001
TOTAL				0.001

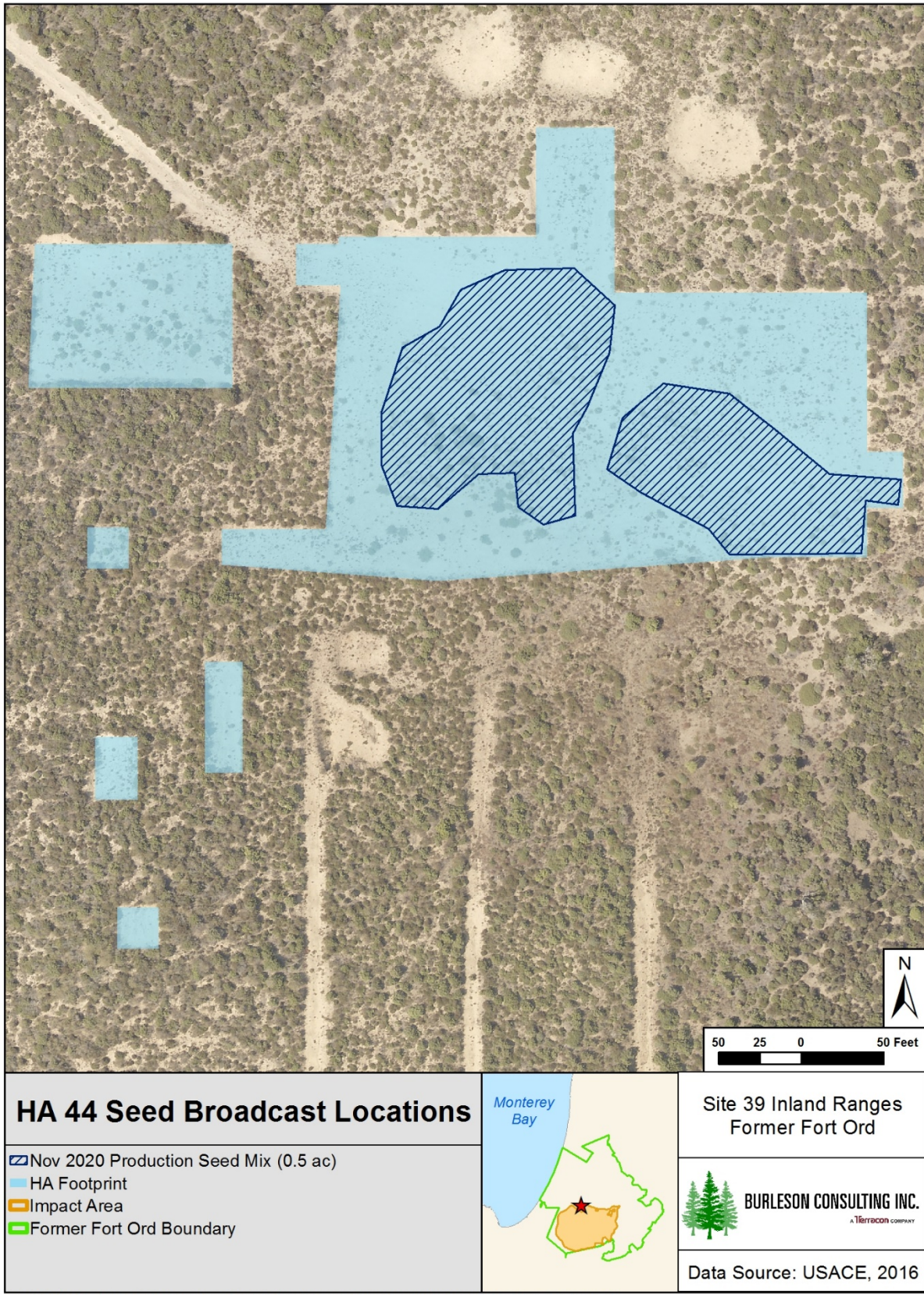


Figure B-15. HA 44 Seed Broadcast Location, Former Fort Ord.

Table B-23. HA 44 Production Seed Mix (Nov 2020)

Species	Amount (lb)
<i>Achillea millefolium</i> (common yarrow)	4.0
<i>Acmispon glaber</i> (deerweed)	4.0
<i>Elymus glaucus</i> (blue wild-rye)	6.0
TOTAL	14.0

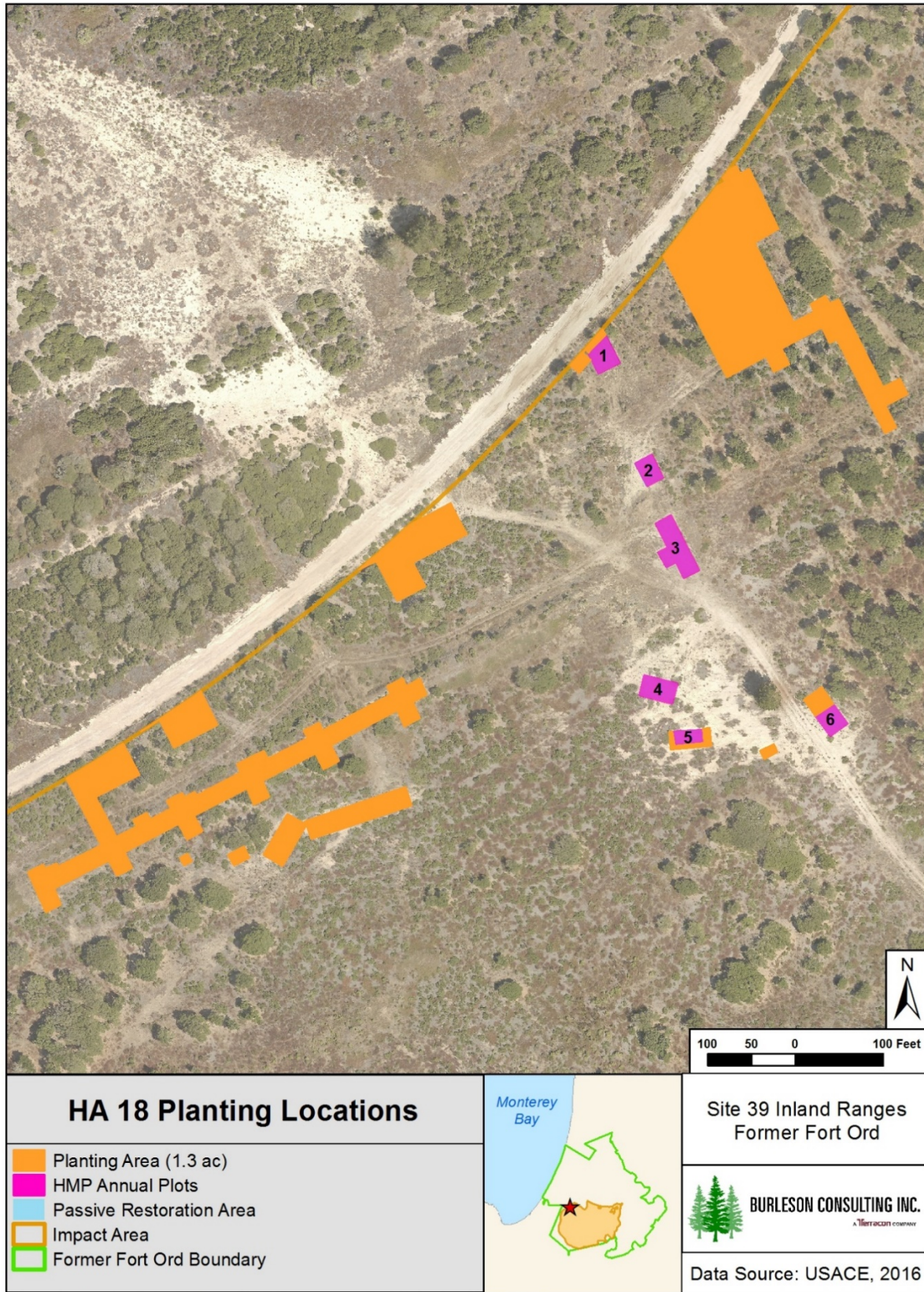


Figure B-16. HA 18 Planting Locations, Former Fort Ord

Table B-24. HA 18 AMP Plant Installation (Jan – Feb 2020)

Species	Species Code	Total Plants Installed (#)
<i>Arctostaphylos pumila</i> * (sandmat manzanita)	ARPU	84
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	CERI	55
<i>Ericameria fasciculata</i> * (Eastwood's goldenbush)	ERFA	49
TOTAL		188

*HMP species

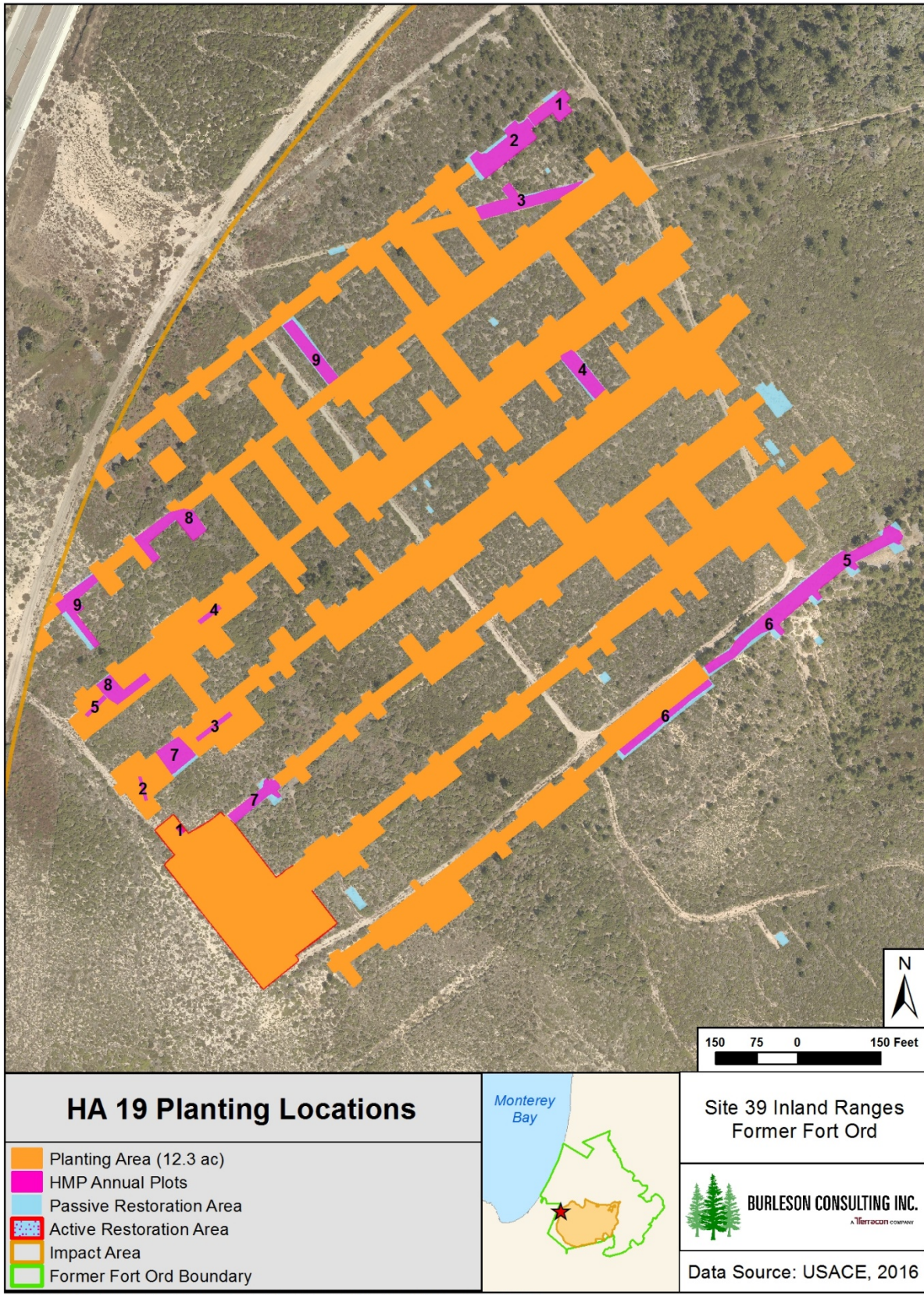


Figure B-17. HA 19 Planting Locations, Former Fort Ord

Table B-25. HA 19 AMP Plant Installation (Jan 2020)

Species	Species Code	Total Plants Installed (#)
<i>Arctostaphylos pumila</i> * (sandmat manzanita)	ARPU	400
TOTAL		400

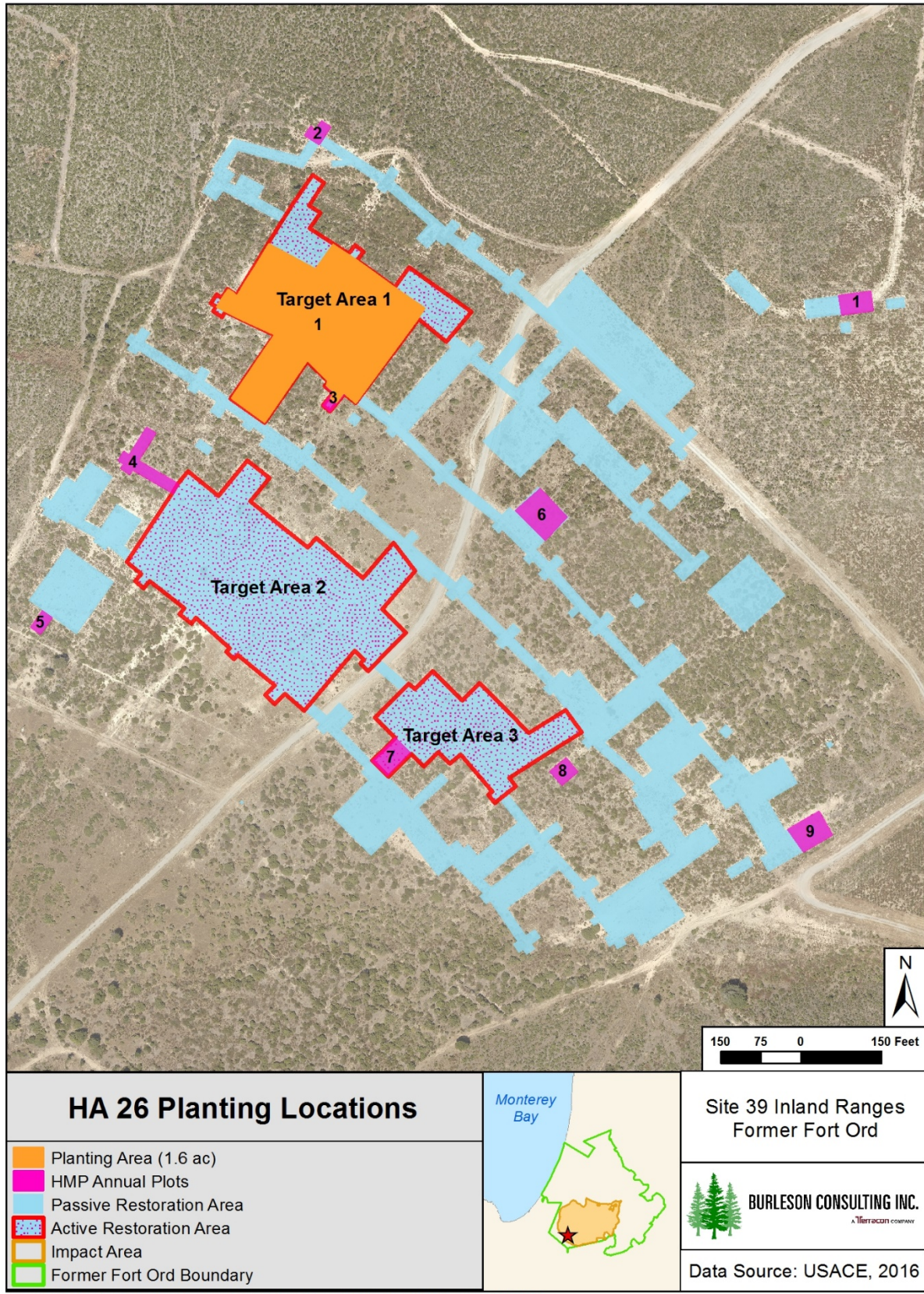


Figure B-18. HA 26 Planting Locations, Former Fort Ord

Table B-26. HA 26 Plant Installation (Dec 2019 – Jan 2020)

Species	Species Code	Total Plants Installed (#)
<i>Achillea millefolium</i> (common yarrow)	ACMI	126
<i>Acmispon glaber</i> (deerweed)	ACGL	175
<i>Adenostoma fasciculatum</i> (chamise)	ADFA	134
<i>Arctostaphylos pumila</i> * (sandmat manzanita)	ARPU	125
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i> (shaggy-bark manzanita)	ARTO	138
<i>Baccharis pilularis</i> (coyote brush)	BAPI	61
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	CERI	125
<i>Crocanthemum scoparium</i> (peak rush-rose)	CRSC	203
<i>Diplacus aurantiacus</i> (sticky monkey flower)	DIAU	125
<i>Eriophyllum confertiflorum</i> (golden yarrow)	ERCO	100
<i>Ericameria fasciculata</i> (Eastwood's goldenbush)	ERFA	100
<i>Horkelia cuneata</i> (wedge-leaved horkelia)	HOCU	175
<i>Lupinus arboreus</i> (yellow bush lupine)	LUAR	15
<i>Salvia mellifera</i> (black sage)	SAME	125
TOTAL		1,727

*HMP species

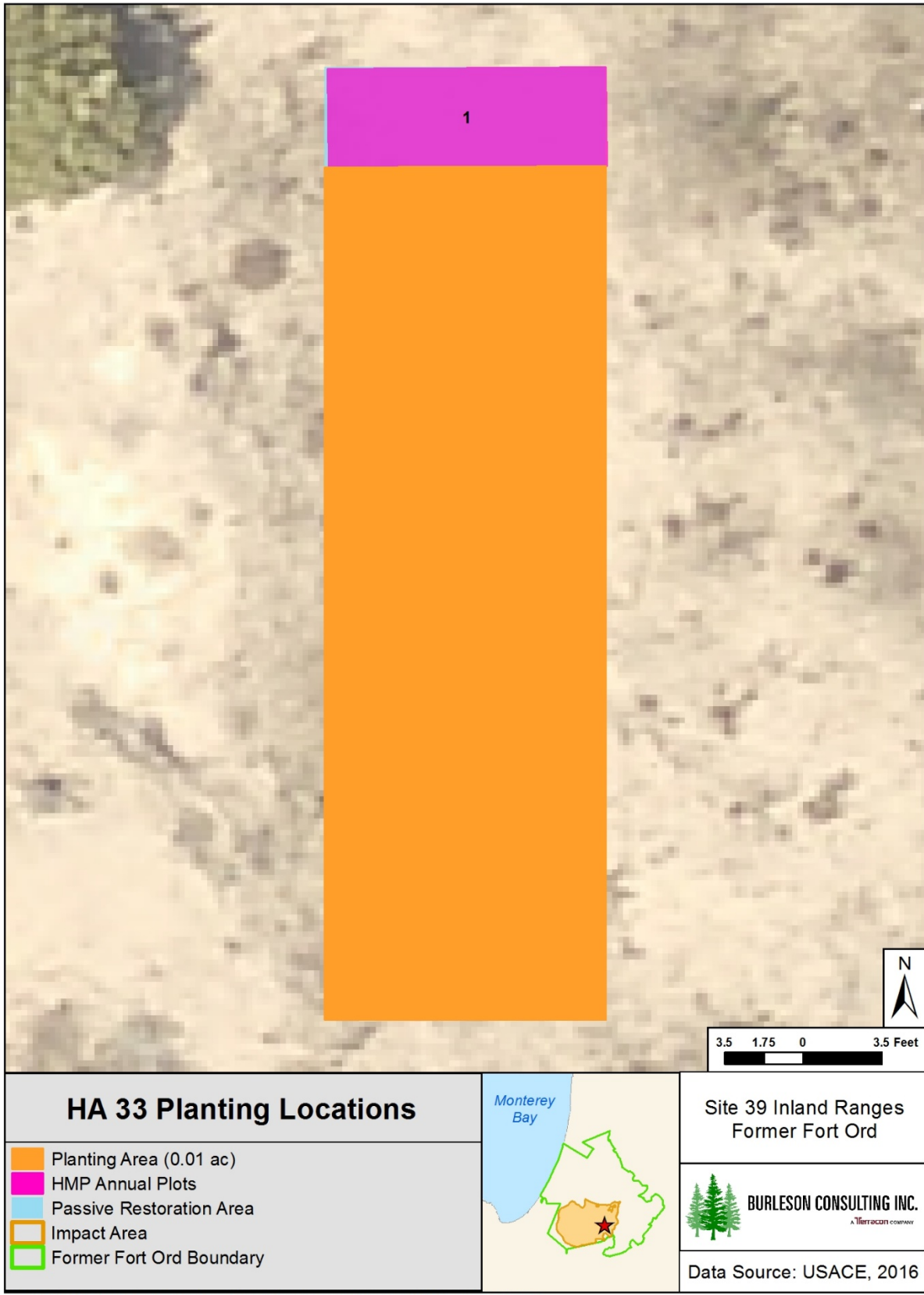


Figure B-19. HA 33 Planting Locations, Former Fort Ord

Table B-27. HA 33 AMP Plant Installation (Jan 2020)

Species	Species Code	Total Plants Installed (#)
<i>Achillea millefolium</i> (common yarrow)	ACMI	2
<i>Acmispon glaber</i> (deerweed)	ACGL	11
<i>Adenostoma fasciculatum</i> (chamise)	ADFA	10
<i>Artemisia californica</i> (California sagebrush)	ARCA	5
<i>Arctostaphylos hookerii</i> * (Hooker's manzanita)	ARHO	3
<i>Arctostaphylos montereyensis</i> * (Monterey manzanita)	ARMO	3
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i> (shaggy-bark manzanita)	ARTO	3
<i>Baccharis pilularis</i> (coyote brush)	BAPI	12
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	CERI	4
<i>Crocanthemum scoparium</i> (peak rush-rose)	CRSC	11
<i>Diplacus aurantiacus</i> (sticky monkey flower)	DIAU	7
<i>Eriophyllum confertiflorum</i> (golden yarrow)	ERCO	6
<i>Frangula californica</i> (California coffeeberry)	FRCA	3
<i>Garrya elliptica</i> (coast silk tassel)	GAEL	9
<i>Horkelia cuneata</i> (wedge-leaved horkelia)	HOCU	11
<i>Lepechinia calycina</i> (pitcher sage)	LECA	5
<i>Lupinus arboreus</i> (yellow bush lupine)	LUAR	4
<i>Salvia mellifera</i> (black sage)	SAME	6
TOTAL		115

*HMP species

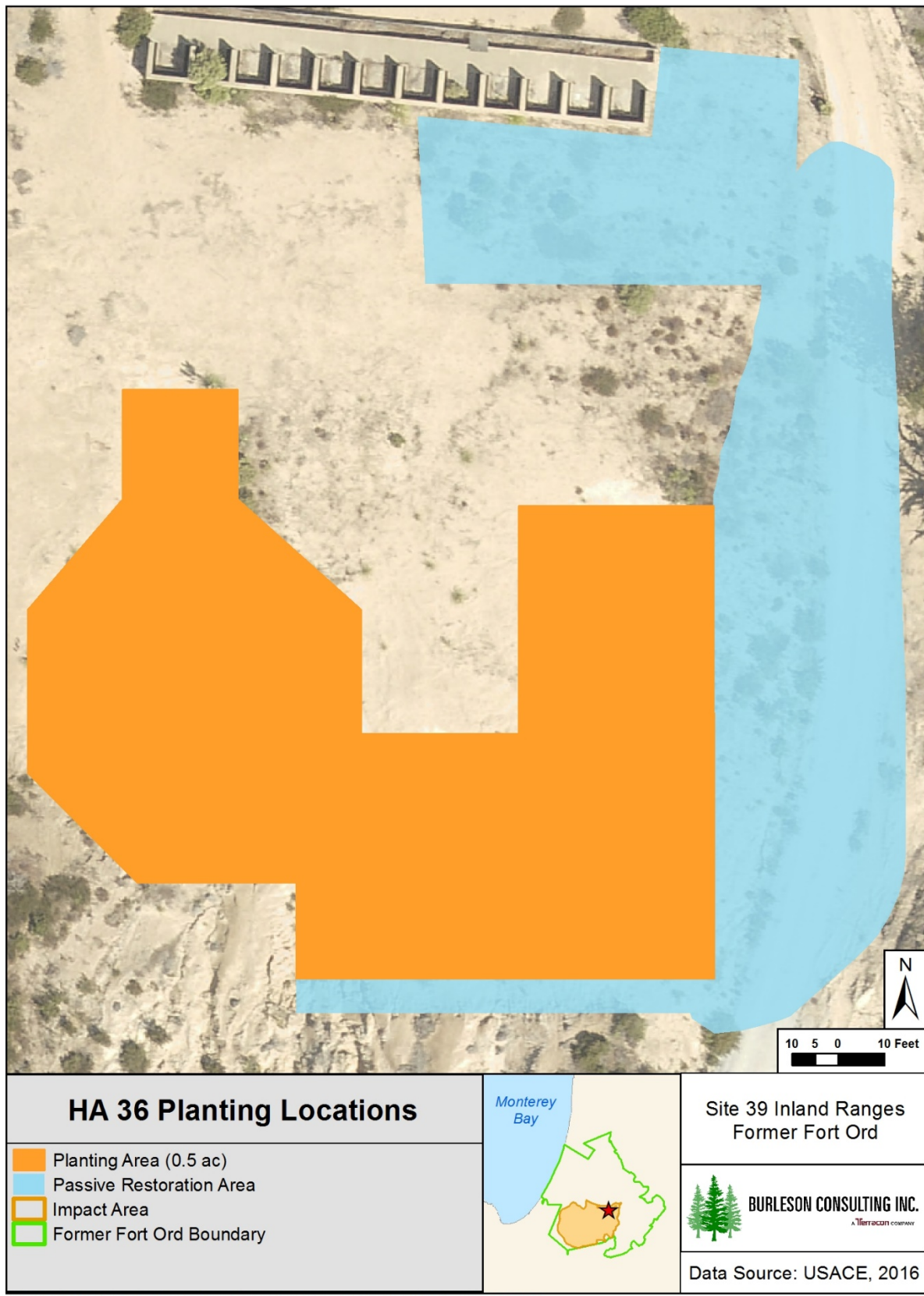


Figure B-20. HA 36 Planting Locations, Former Fort Ord

Table B-28. HA 36 AMP Plant Installation (Jan - Feb 2020)

Species	Species Code	Total Plants Installed (#)
<i>Achillea millefolium</i> (common yarrow)	ACMI	10
<i>Acmispon glaber</i> (deerweed)	ACGL	80
<i>Adenostoma fasciculatum</i> (chamise)	ADFA	37
<i>Artemisia californica</i> (California sagebrush)	ARCA	29
<i>Arctostaphylos hookerii</i> * (Hooker's manzanita)	ARHO	50
<i>Arctostaphylos montereyensis</i> * (Monterey manzanita)	ARMO	59
<i>Arctostaphylos pumila</i> * (sandmat manzanita)	ARPU	17
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i> (shaggy-bark manzanita)	ARTO	60
<i>Baccharis pilularis</i> (coyote brush)	BAPI	23
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	CERI	37
<i>Crocanthemum scoparium</i> (peak rush-rose)	CRSC	56
<i>Diplacus aurantiacus</i> (sticky monkey flower)	DIAU	50
<i>Horkelia cuneata</i> (wedge-leaved horkelia)	HOCU	76
<i>Lupinus arboreus</i> (yellow bush lupine)	LUAR	50
<i>Salvia mellifera</i> (black sage)	SAME	75
TOTAL		709

*HMP species

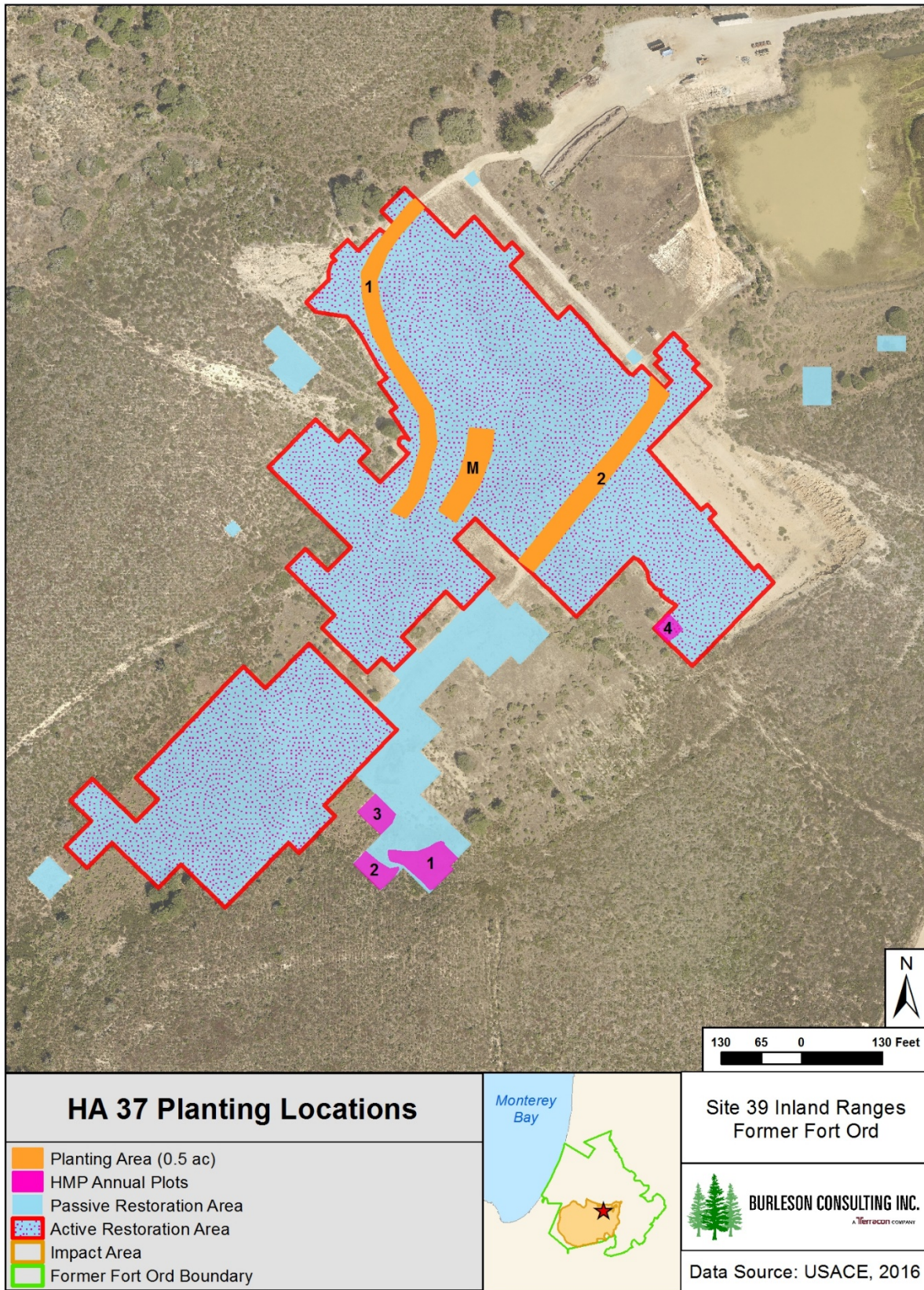


Figure B-21. HA 37 Planting Locations, Former Fort Ord

Table B-29. HA 37 Plant Installation (Dec 2019 - Jan 2020)

Species	Species Code	Total Plants Installed (#)
<i>Achillea millefolium</i> (common yarrow)	ACMI	35
<i>Acmispon glaber</i> (deerweed)	ACGL	33
<i>Adenostoma fasciculatum</i> (chamise)	ADFA	118
<i>Artemisia californica</i> (California sagebrush)	ARCA	24
<i>Arctostaphylos hookerii</i> * (Hooker's manzanita)	ARHO	19
<i>Arctostaphylos montereyensis</i> * (Monterey manzanita)	ARMO	33
<i>Arctostaphylos pumila</i> * (sandmat manzanita)	ARPU	25
<i>Arctostaphylos tomentosa</i> ssp. <i>tomentosa</i> (shaggy-bark manzanita)	ARTO	95
<i>Baccharis pilularis</i> (coyote brush)	BAPI	71
<i>Ceanothus rigidus</i> * (Monterey ceanothus)	CERI	32
<i>Crocanthemum scoparium</i> (peak rush-rose)	CRSC	33
<i>Diplacus aurantiacus</i> (sticky monkey flower)	DIAU	34
<i>Eriophyllum confertiflorum</i> (golden yarrow)	ERCO	25
<i>Frangula californica</i> (California coffeeberry)	FRCA	7
<i>Garrya elliptica</i> (coast silk tassel)	GAEL	25
<i>Horkelia cuneata</i> (wedge-leaved horkelia)	HOCU	33
<i>Lepechinia calycina</i> (pitcher sage)	LECA	20
<i>Lupinus arboreus</i> (yellow bush lupine)	LUAR	33
<i>Lupinus chamissonis</i> (silver beach lupine)	LUCH	33
<i>Salvia mellifera</i> (black sage)	SAME	40
TOTAL		768

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APPENDIX C

Photo Log

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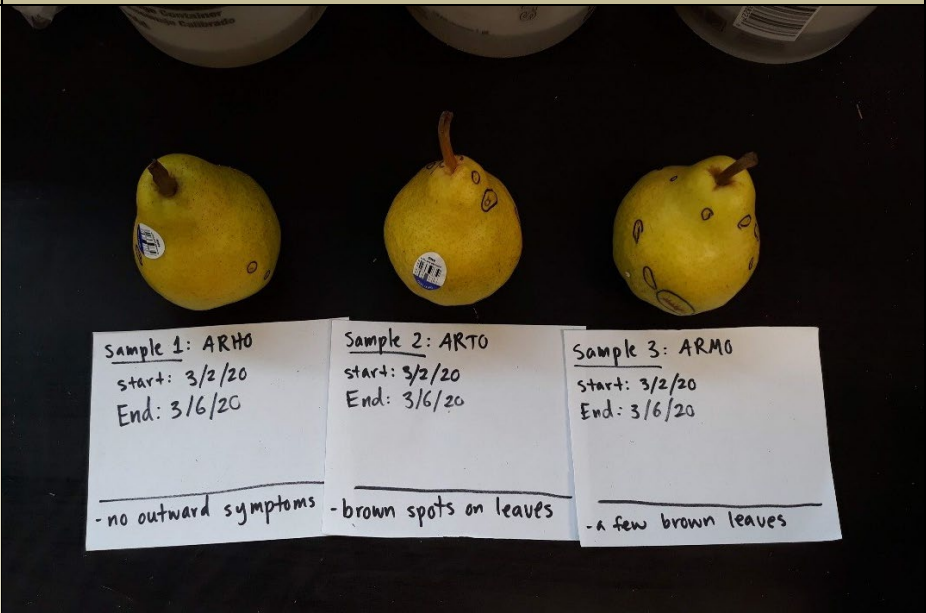
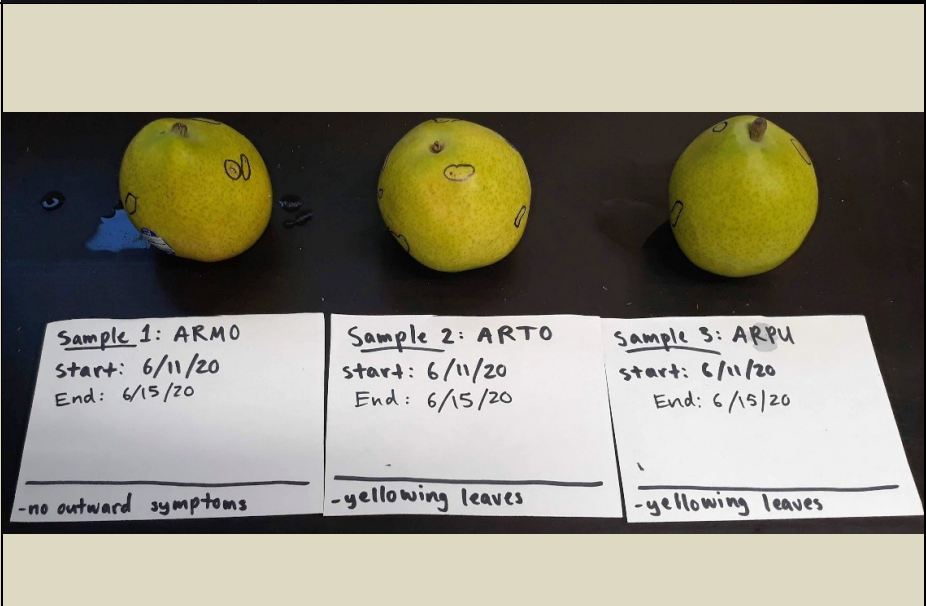
Photo Description	Photo
<p>Burleson Carmel Valley Native Plant Nursery</p> <p>Negative results of the March pear test</p> <p>C-1</p>	 <p>The photo shows three yellow pears arranged horizontally. Below each pear is a small white card with handwritten text. The cards provide details for Sample 1 (ARTO), Sample 2 (ARTO), and Sample 3 (ARMO), including start and end dates (3/2/20 to 3/6/20) and observations: 'no outward symptoms', 'brown spots on leaves', and 'a few brown leaves'.</p>
<p>Burleson Carmel Valley Native Plant Nursery</p> <p>Negative results of the June pear test</p> <p>C-2</p>	 <p>The photo shows three yellow pears arranged horizontally. Below each pear is a small white card with handwritten text. The cards provide details for Sample 1 (ARMO), Sample 2 (ARTO), and Sample 3 (ARPU), including start and end dates (6/11/20 to 6/15/20) and observations: 'no outward symptoms', 'yellowing leaves', and 'yellowing leaves'.</p>



Photo Description	Photo
<p>Burleson Carmel Valley Native Plant Nursery</p> <p>Negative results of the October Carmel Valley Nursery pear test</p> <p>C-3</p>	
<p>Burleson Carmel Valley Native Plant Nursery</p> <p>Negative results of the October Joe Lloyd Way yard pear test</p> <p>C-4</p>	


Photo Description	Photo
<p>Burleson Carmel Valley Native Plant Nursery</p> <p>Negative results of the December pear test</p> <p>C-5</p>	 <p>Sample 1: ARHO Start: 12/17/20 End: 12/21/20 no outward symptoms</p> <p>Sample 2: ARPU Start: 12/17/20 End: 12/21/20 yellowing leaves</p> <p>Sample 3: DIAU Start: 12/17/20 End: 12/21/20 no outward symptoms</p>
<p>Seed Collection</p> <p>Burleson biologist collecting peak rush-rose (<i>Crocanthemum scoparium</i>) seed</p> <p>C-6</p>	



Photo Description	Photo
<p>Seed Collection</p> <p>Burleson biologist collecting Monterey spineflower (<i>Chorizanthe pungens</i> var. <i>pungens</i>) seed</p> <p>C-7</p>	 A wide-angle photograph showing a biologist wearing a cap and a high-visibility vest kneeling in a field of low-lying green and brown shrubs. The biologist is holding a brown paper bag, likely for seed collection. The background shows a sloping hillside with similar vegetation under a clear blue sky.
<p>Seed Collection</p> <p>Seaside bird's beak (<i>Cordylanthus rigidus</i> ssp. <i>littoralis</i>) seed collection</p> <p>C-8</p>	 A close-up photograph of a brown paper bag filled with small, light-brown, elongated seeds. The bag is placed on the ground among dry, tangled plant matter and some green leaves.



Photo Description	Photo
<p>Seed Collection</p> <p>Burleson biologist processing golden yarrow (<i>Eriophyllum confertiflorum</i>) seed</p> <p>C-9</p>	
<p>Seed Collection</p> <p>Burleson biologist processing Monterey ceanothus (<i>Ceanothus rigidus</i>) seed</p> <p>C-10</p>	



Photo Description	Photo
<p>Seed Collection</p> <p>Monterey ceanothus seed after processing</p> <p>C-11</p>	
<p>Seed Collection</p> <p>Black sage (<i>Salvia mellifera</i>) seed after processing</p> <p>C-12</p>	

Photo Description	Photo
<p>Seed Collection</p> <p>Yellow bush lupine (<i>Lupinus arboreus</i>) seed</p> <p>C-13</p>	
<p>Seed Collection</p> <p>Sand gilia (<i>Gilia tenuiflora</i> ssp. <i>arenaria</i>) seed</p> <p>C-14</p>	

Photo Description	Photo	
<p>Seed Production</p> <p>Deerweed (<i>Acmispon glaber</i>) production plot at S&S Seeds</p> <p>C-15</p>		
<p>Seed Production</p> <p>Deerweed production plot at S&S Seeds during harvest</p> <p>C-16</p>		



Photo Description	Photo
<p>Plant Propagation</p> <p>Silver beach lupine (<i>Lupinus chamissonis</i>) seed clipped for higher germination rate</p> <p>C-17</p>	
<p>Plant Propagation</p> <p>Burleson biologist filling cones</p> <p>C-18</p>	



Photo Description	Photo
<p>Plant Propagation</p> <p>Manzanita (<i>Arctostaphylos</i> sp.) cutting trays in greenhouse</p> <p>C-19</p>	 A photograph showing a large greenhouse filled with numerous trays of Manzanita cuttings. The cuttings are small, green, and rooted, arranged in neat rows on black plastic trays. The greenhouse structure is visible in the background.
<p>Plant Propagation</p> <p>Burleson biologists transplanting from seed trays to cones</p> <p>C-20</p>	 A photograph showing three people working outdoors in a nursery setting. Two people, a man in an orange jacket and a woman in a grey hoodie, are focused on transplanting small seedlings from black seed trays into larger black cones. A third person is partially visible in the background. The ground is covered with mulch and there are trees in the background.



Photo Description	Photo	
<p>Plant Propagation</p> <p>Burleson nursery manager up potting manzanitas</p> <p>C-21</p>		 A woman with reddish-brown hair tied back, wearing an orange long-sleeved shirt, blue jeans, and a grey face mask, is working under a white pop-up tent. She is using a black potting tool to fill a black plastic nursery pot with soil. Several other similar pots, some containing small green seedlings, are arranged on a table in front of her. The background shows trees and other outdoor equipment.
<p>Plant Propagation</p> <p>Transplanting sandmat manzanita (<i>Arctostaphylos pumila</i>)</p> <p>C-22</p>		 A woman wearing a blue knit beanie, a grey jacket, and a red shirt is working outdoors. She is carefully transplanting small green seedlings from one black plastic nursery pot into another. The pots are arranged in a black plastic tray. A white bucket filled with dark soil is visible next to her. The background shows a grassy area with trees and a fence.



Photo Description	Photo
<p>Plant Propagation</p> <p>Monterey manzanita (<i>Arctostaphylos montereyensis</i>)</p> <p>C-23</p>	
<p>Plant Propagation</p> <p>Peak rush-rose</p> <p>C-24</p>	



Photo Description	Photo	
Plant Propagation Wedge-leaved horkelia (<i>Horkelia cuneata</i>) C-25		
Plant Propagation Manzanita species for HA 29 C-26		

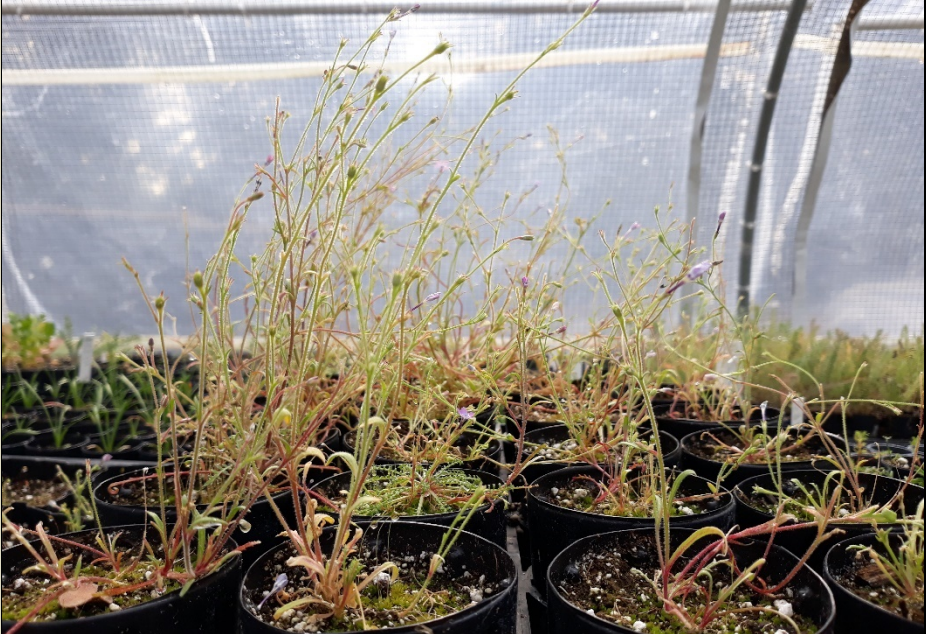

Photo Description	Photo
<p>Plant Propagation</p> <p>Sand gilia in greenhouse</p> <p>C-27</p>	
<p>Plant Propagation</p> <p>Expansion of the native plant nursery</p> <p>C-28</p>	



Photo Description	Photo
<p>Plant Propagation</p> <p>Burleson biologist watering plants at native plant nursery</p> <p>C-29</p>	 A biologist wearing a grey t-shirt and a black face mask is watering rows of small green seedlings in black plastic nursery trays. She is using a green hose with a spray nozzle. The nursery is outdoors, surrounded by trees and a wooden fence.
<p>Nursery Evacuation</p> <p>Nursery evacuation on August 21, 2020</p> <p>C-30</p>	 Four people are working in a nursery area. One person in an orange shirt is loading seedlings into a black plastic tray on a small cart. Another person in a white shirt is standing near a green utility vehicle. Two other people are in the background. The area is enclosed by a chain-link fence, and there are many trees in the background.



Photo Description	Photo
<p>Nursery Evacuation</p> <p>Nursery evacuation on August 21, 2020</p> <p>C-31</p>	
<p>Nursery Evacuation</p> <p>Empty nursery after evacuation</p> <p>C-32</p>	


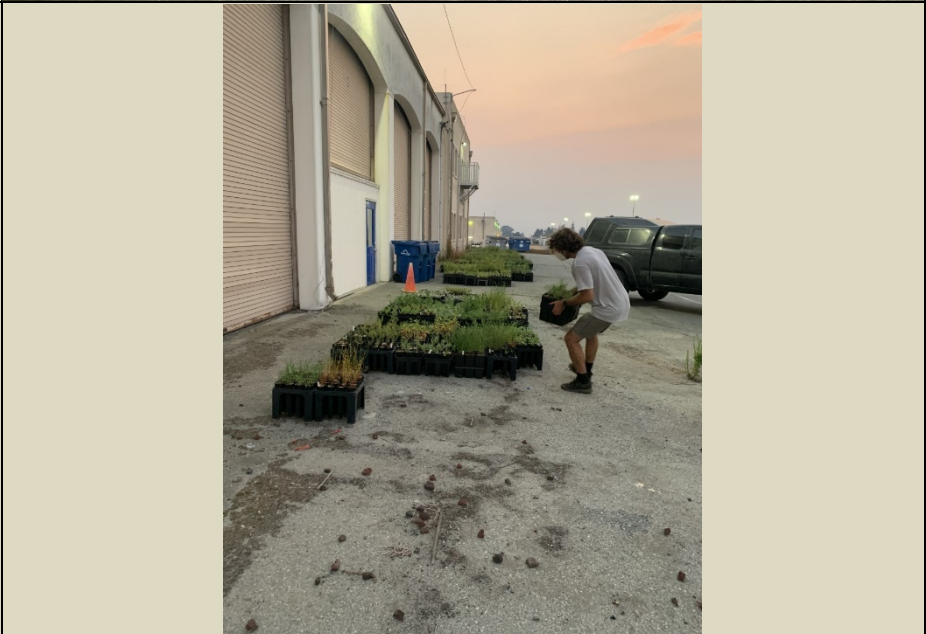
Photo Description	Photo
<p>Nursery Evacuation</p> <p>Nursery evacuation on August 21, 2020</p> <p>C-33</p>	
<p>Nursery Evacuation</p> <p>Nursery evacuation on August 21, 2020</p> <p>C-34</p>	



Photo Description	Photo	
Nursery Evacuation Nursery evacuation on August 21, 2020 C-35		
Nursery Evacuation Plants at Joe Lloyd Way yard C-36		



Photo Description	Photo	
<p>Passive Restoration</p> <p>Monterey spineflower seed broadcast at HA 26</p> <p>C-37</p>		
<p>Passive Restoration</p> <p>Burleson biologists raking seed at HA 26</p> <p>C-38</p>		



Photo Description	Photo
<p>Passive Restoration</p> <p>Burleson biologists covering seed with straw at HA 26</p> <p>C-39</p>	 A wide-angle photograph showing two people in an arid, open landscape. The person in the foreground is wearing an orange shirt, dark pants, and a white visor, holding a large bundle of straw. The person in the background is wearing a hat and a light-colored shirt, also holding straw. The ground is dry and sandy with sparse, low-lying shrubs. The sky is clear and blue.
<p>Passive Restoration</p> <p>Seed for HA 34</p> <p>C-40</p>	 A close-up photograph of a white plastic bucket filled with a large quantity of dry, brown straw or seed material. The bucket is placed on the ground in a dry, sandy area with sparse vegetation. The background shows a dry, hilly landscape under a clear sky.



Photo Description	Photo
<p>Passive Restoration</p> <p>Burleson biologists raking seed at HA 34</p> <p>C-41</p>	 A photograph showing two individuals in orange safety vests and hard hats working on a dry, hilly landscape. They are using long-handled rakes to clear the ground, likely for seed collection or distribution. The terrain is covered with sparse, dry vegetation and small shrubs. A large log lies on the ground in the foreground.
<p>Passive Restoration</p> <p>Burleson biologist covering seed with straw at HA 34</p> <p>C-42</p>	 A photograph showing a single individual in an orange safety vest and hard hat working on a dry, hilly landscape. The person is using a tool to spread straw or mulch over the ground, likely to protect seeds. The terrain is covered with sparse, dry vegetation and small shrubs. A large log lies on the ground in the foreground.



Photo Description	Photo
<p>Passive Restoration</p> <p>Completed seed broadcast at HA 34</p> <p>C-43</p>	 A photograph showing a hillside with sparse, dry vegetation. A small, dark-colored vehicle is parked on a path or road that runs across the middle of the slope. Two people are standing near the vehicle. The hillside is covered with low-lying shrubs and grasses. The sky is clear and blue.
<p>Passive Restoration</p> <p>Burleson biologists raking seed at HA 37</p> <p>C-44</p>	 A photograph showing two people, identified as Burleson biologists, working on a hillside. They are using long-handled rakes to spread seed on the ground. The terrain is covered with dry, brownish vegetation and small shrubs. The sky is clear and blue.



Photo Description	Photo
<p>Passive Restoration</p> <p>Burleson biologists covering seed with straw at HA 37</p> <p>C-45</p>	
<p>Passive Restoration</p> <p>Seaside bird's beak seed broadcast at HA 38</p> <p>C-46</p>	



Photo Description	Photo	
<p>Passive Restoration</p> <p>Burleson biologist raking seaside bird's beak seed at HA 38</p> <p>C-47</p>		
<p>Passive Restoration</p> <p>Completed seaside bird's beak broadcast at HA 38</p> <p>C-48</p>		



Photo Description	Photo
<p>Passive Restoration</p> <p>Completed sand gilia broadcast at HA 38</p> <p>C-49</p>	
<p>Passive Restoration</p> <p>Sand gilia seed broadcast at HA 43</p> <p>C-50</p>	



Photo Description	Photo	
<p>Passive Restoration</p> <p>Burleson biologist raking sand gilia seed at HA 43</p> <p>C-51</p>		
<p>Active Restoration</p> <p>Burleson biologist installing plants at HA 18</p> <p>C-52</p>		

Photo Description	Photo
<p>Active Restoration</p> <p>Burleson biologist installing plants at HA 19</p> <p>C-53</p>	 A biologist wearing an orange long-sleeved shirt, a grey baseball cap, and gloves is kneeling on sandy, hilly ground. They are installing a small plant into the soil. A white bucket and a green-handled shovel are nearby. The background shows a clear blue sky and distant hills.
<p>Active Restoration</p> <p>Sandmat manzanita installed at HA 19</p> <p>C-54</p>	 A close-up shot of a small, green sandmat manzanita plant with thick, rounded leaves, recently installed in sandy soil. The plant is casting a shadow on the sand. A dry leaf lies on the sand to the left. The background shows a clear blue sky and distant hills.



Photo Description	Photo
<p>Active Restoration</p> <p>Burleson senior ecologist installing black sage at HA 26</p> <p>C-55</p>	 A man wearing an orange long-sleeved shirt, a high-visibility safety vest, and jeans is kneeling in a dry, grassy field. He is focused on planting a small, dark-colored shrub into the ground. The background shows a vast, open landscape with scattered low-lying vegetation and distant hills under a sky with scattered clouds.
<p>Active Restoration</p> <p>HA 33 after plant installation</p> <p>C-56</p>	 A wide-angle photograph of a dry, grassy field. The foreground is dominated by dry, yellowish-brown grass. In the middle ground, there are patches of green shrubs and bushes. A long, dark shadow of a person is cast across the grass in the lower-left foreground. The background features rolling hills and a clear blue sky.



Photo Description	Photo
<p>Active Restoration</p> <p>Burleson biologist installing plants at HA 36</p> <p>C-57</p>	
<p>Active Restoration</p> <p>Burleson biologists installing plants at HA 36</p> <p>C-58</p>	

Photo Description	Photo
Active Restoration HA 36 after plant installation C-59	
Active Restoration Burleson biologist installing plants at HA 37 C-60	

Photo Description	Photo
<p>Active Restoration</p> <p>Burleson biologists installing plants at HA 37</p> <p>C-61</p>	 A biologist wearing an orange long-sleeved shirt, a dark cap, and gloves is crouching in a dry, hilly landscape, installing a small plant into the soil. Another person is visible in the background, also working on the ground. The terrain is covered with dry grass and some low-lying shrubs.
<p>Active Restoration</p> <p>Chamise (<i>Adenostoma fasciculata</i>) and wedge-leaved horkelia installed at HA 37</p> <p>C-62</p>	 A field of dry grass and rocks with several small, young plants installed. Pink flags are placed in the ground to mark the locations of the plants. The background shows a line of trees under a blue sky with scattered clouds.



Photo Description	Photo
Monitoring Monterey spineflower C-63	
Monitoring Sand gilia C-64	



Photo Description	Photo	
Monitoring Seaside bird's beak C-65		
Monitoring Burleson biologists surveying HA 39/40 for HMP Annuals C-66		


Photo Description	Photo
<p>Monitoring</p> <p>Burleson biologist conducting vegetative cover survey at HA 26</p> <p>C-67</p>	 A photograph showing two people in a coastal dune environment. One person, wearing an orange shirt and a hat, is kneeling and measuring a plant. The other person, wearing a yellow safety vest and a hat, is standing and looking at a clipboard. The ground is sandy with sparse, low-lying vegetation. The sky is clear and blue.
<p>Erosion Control Repairs</p> <p>Straw used for covering seed</p> <p>C-68</p>	 A photograph of a white pickup truck and a black trailer parked on a paved surface. The truck's bed and the trailer are loaded with several large, rectangular bales of straw or hay, secured with yellow straps. In the background, there are some buildings and a clear sky.



Photo Description	Photo	
Erosion Control Repairs Coir fabric and wattle installation at HA 26 C-69		
Erosion Control Repairs Burleson biologist installing wattle at HA 28 C-70		



Photo Description	Photo	
Erosion Control Repairs Seed and straw broadcast at HA 28 C-71		
Erosion Control Repairs Burleson biologist raking seed at HA 34 C-72		



Photo Description	Photo
<p>Erosion Control Repairs</p> <p>Burleson biologist spreading straw over production seed at HA 34</p> <p>C-73</p>	 A photograph showing a biologist in an orange shirt and dark pants standing on a dry, hilly slope. The slope is covered with sparse, low-lying vegetation and patches of bare soil. The biologist appears to be spreading straw or seed over the ground. The sky is blue with some clouds.
<p>Erosion Control Repairs</p> <p>Wattle installation at HA 34</p> <p>C-74</p>	 A photograph showing a wattle installation on a hillside. A long, cylindrical structure made of woven straw or wattle is laid out on the ground. A person in an orange shirt is visible in the background, working on the installation. The hillside is covered with dry vegetation and some green shrubs.



Photo Description	Photo
<p>Erosion Control Repairs</p> <p>UXO support for wattle installation at HA 36</p> <p>C-75</p>	 A photograph showing three workers in high-visibility safety vests and hard hats working on a steep, eroded hillside. They are installing wattle erosion control measures. One worker is using a tool to secure the wattle, while the others are observing or assisting. The hillside is exposed soil, and the background shows a clear blue sky and distant vegetation.
<p>Erosion Control Repairs</p> <p>Completed erosion control repairs at HA 36</p> <p>C-76</p>	 A photograph showing a wide view of a completed erosion control project on a hillside. The hillside is covered with wattle erosion control measures, and the surrounding area is dry, sandy soil with sparse vegetation. The background shows a clear blue sky and distant hills.



Photo Description	Photo
<p>Irrigation</p> <p>Sala Brothers Water Trucking filling water tanks at HA 26</p> <p>C-77</p>	 A yellow water truck is parked on a gravel road next to a large green water tank. The truck is a Kenworth model with a silver water tank. Another yellow water truck is visible in the background. The scene is set in a dry, open landscape under a clear blue sky.
<p>Irrigation</p> <p>Sala Brothers Water Trucking filling water tanks at HA 26</p> <p>C-78</p>	 A yellow water truck is parked on a gravel road next to a large green water tank. A red hose is connected to the tank and extends across the road. The scene is set in a dry, open landscape under a clear blue sky.



Photo Description	Photo
<p>Irrigation</p> <p>Painting PVC to reduce sun damage</p> <p>C-79</p>	 A person wearing an orange long-sleeved shirt, dark pants, a light-colored baseball cap, and a black face mask is crouching in a field. They are using a brush to paint a white PVC pipe. A white bucket of paint is on the ground next to them. The field has sparse green vegetation and gravelly soil under a clear blue sky.
<p>Irrigation</p> <p>Painting PVC to reduce sun damage</p> <p>C-80</p>	 A long white PVC pipe lies on the ground in a field. A person's leg and a white bucket are visible in the foreground. The pipe runs across the field, which has some green shrubs and a body of water in the background under a cloudy sky.



Photo Description	Photo
<p>Irrigation</p> <p>Burleson biologist repairing pump output hose</p> <p>C-81</p>	 A person wearing an orange long-sleeved shirt, a grey bucket hat, and a neck gaiter is kneeling on sandy ground. They are working on a green corrugated hose connected to a red and black pump. The background shows some dry vegetation.
<p>Irrigation</p> <p>Burleson biologist repairing irrigation lines</p> <p>C-82</p>	 A person wearing an orange long-sleeved shirt, a grey bucket hat, and a high-visibility orange safety vest is kneeling on sandy ground. They are working on black irrigation lines. The background shows some dry vegetation.





Photo Description	Photo
<p>Irrigation</p> <p>Before and after spaghetti line repairs</p> <p>C-83</p>	 A close-up photograph showing a black spaghetti line irrigation system installed in a dry, sandy area. The line runs vertically through the center of the frame. To the left, there is some green and brown vegetation. The ground is light-colored sand with some small rocks and dried plant matter.
<p>Irrigation</p> <p>East side of irrigation system</p> <p>C-84</p>	 A wide-angle photograph showing the east side of the irrigation system. The foreground is a large, flat area of dry, sandy ground with sparse, low-lying vegetation. In the background, there are rolling hills under a clear blue sky. The overall scene is arid and open.

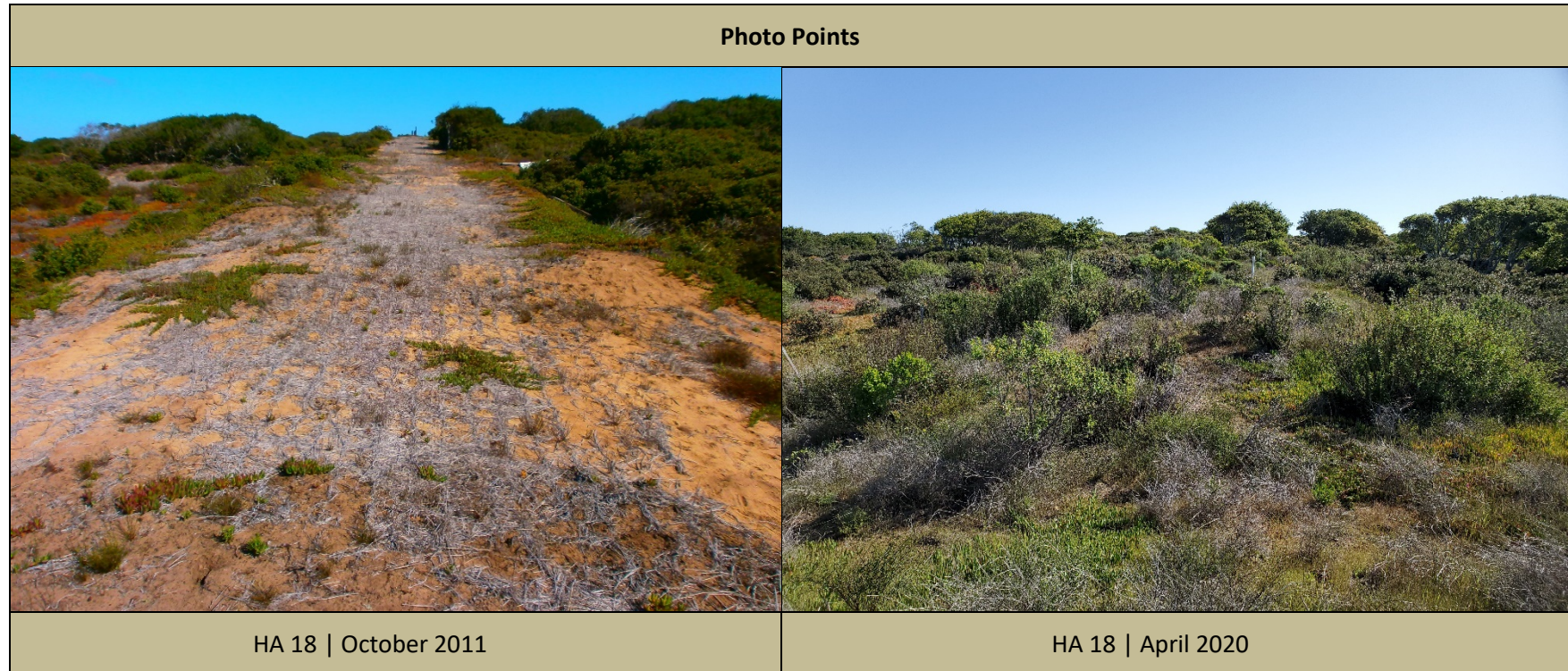
Photo Description	Photo
<p>Irrigation</p> <p>West side of irrigation system</p> <p>C-85</p>	
<p>Community Involvement</p> <p>Burleson's tabling display at the Army Open House on February 1, 2020</p> <p>C-86</p>	

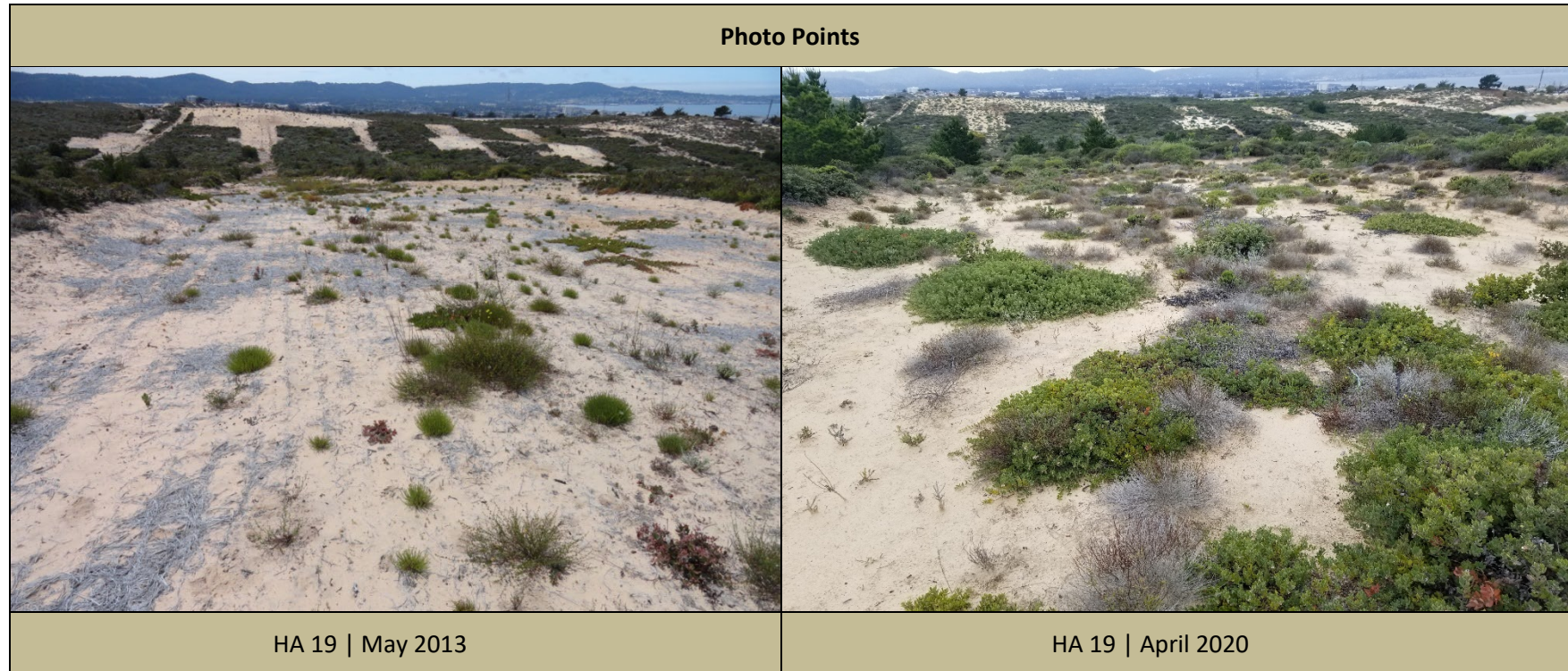
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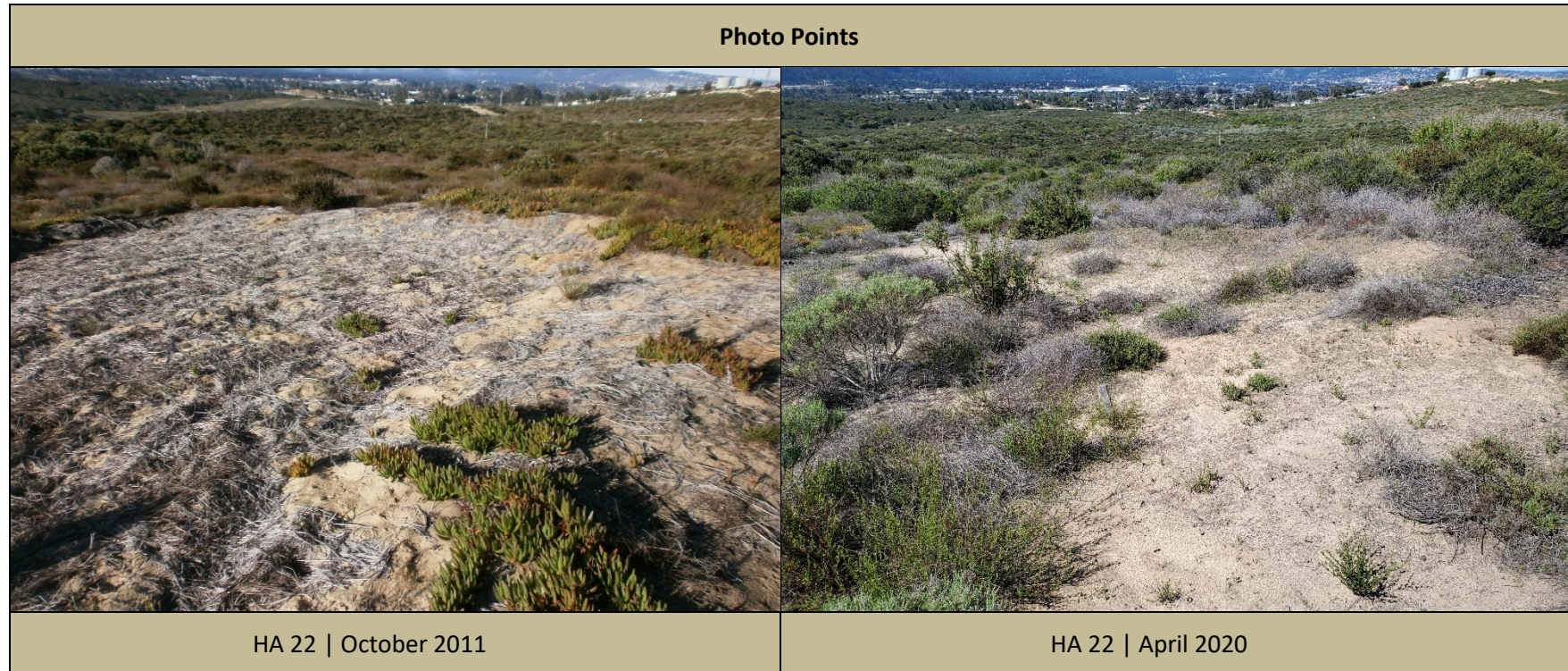
APPENDIX D

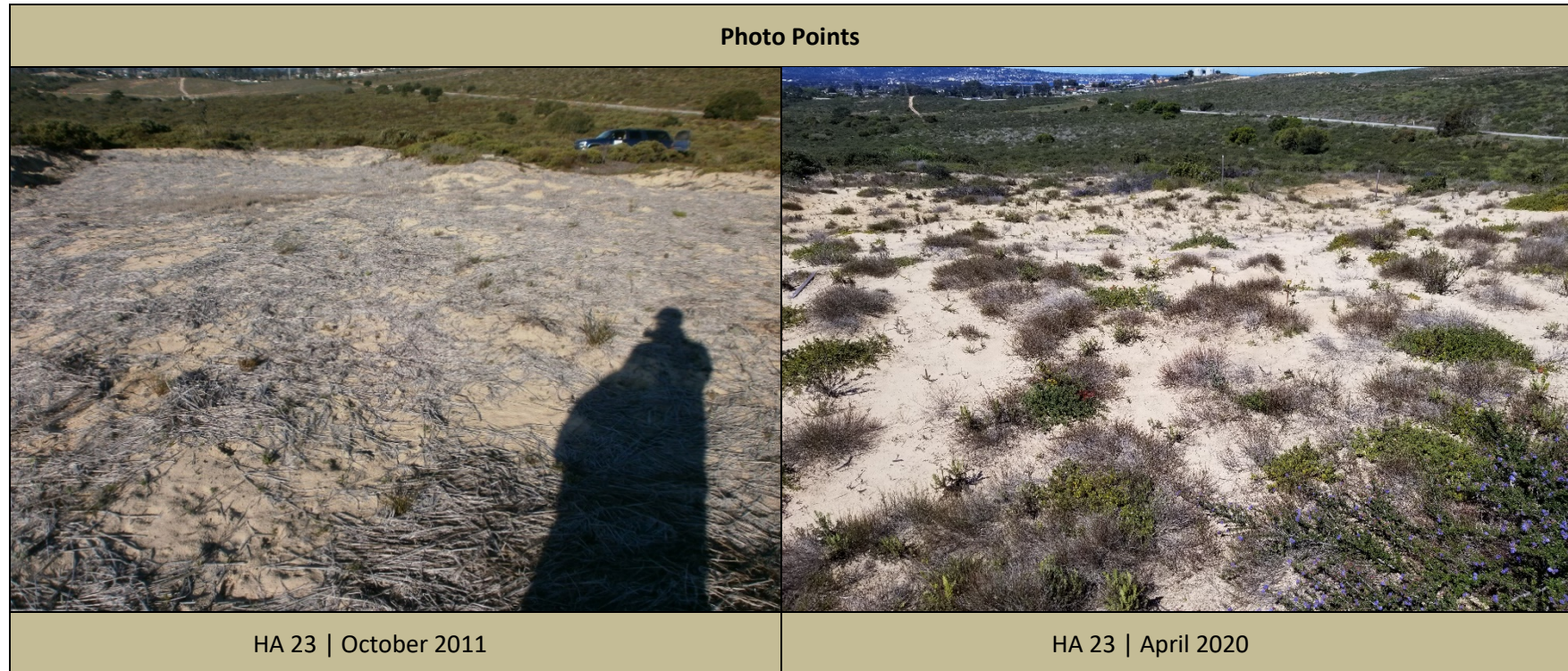
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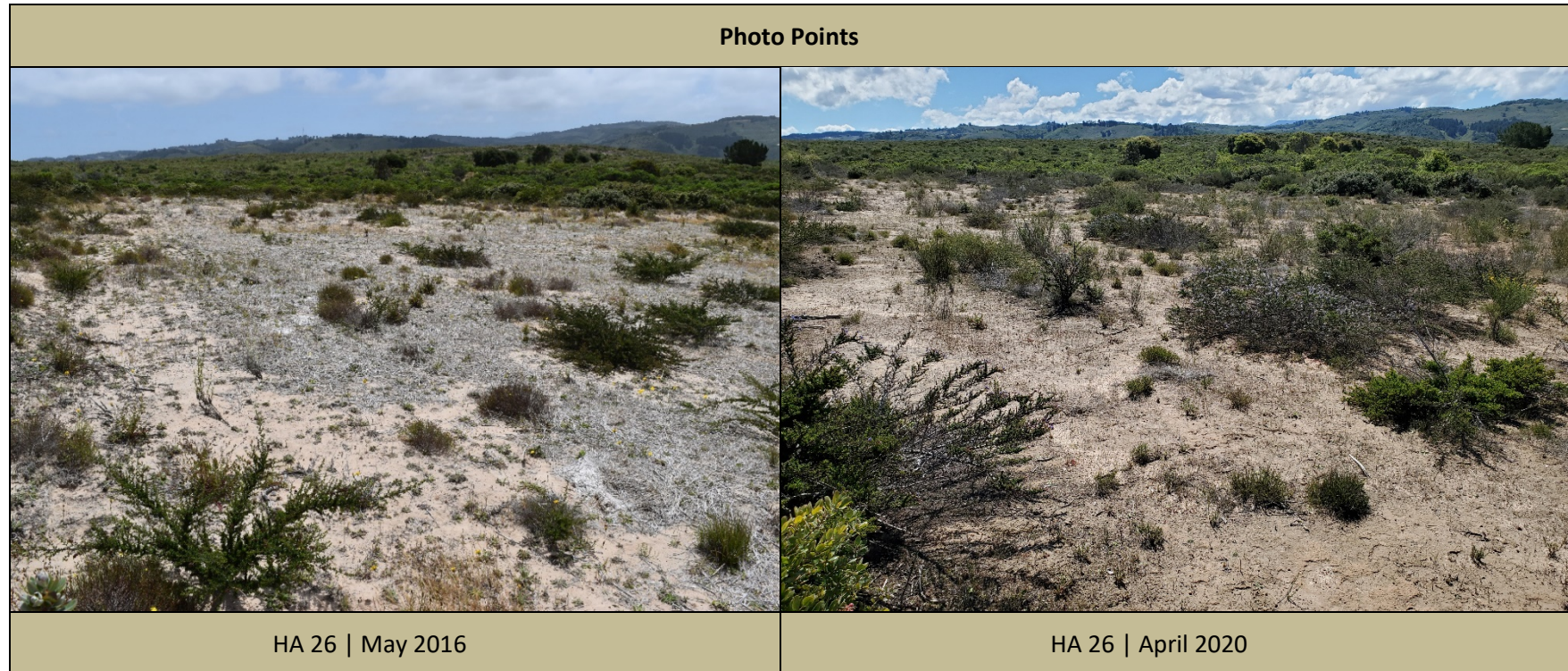
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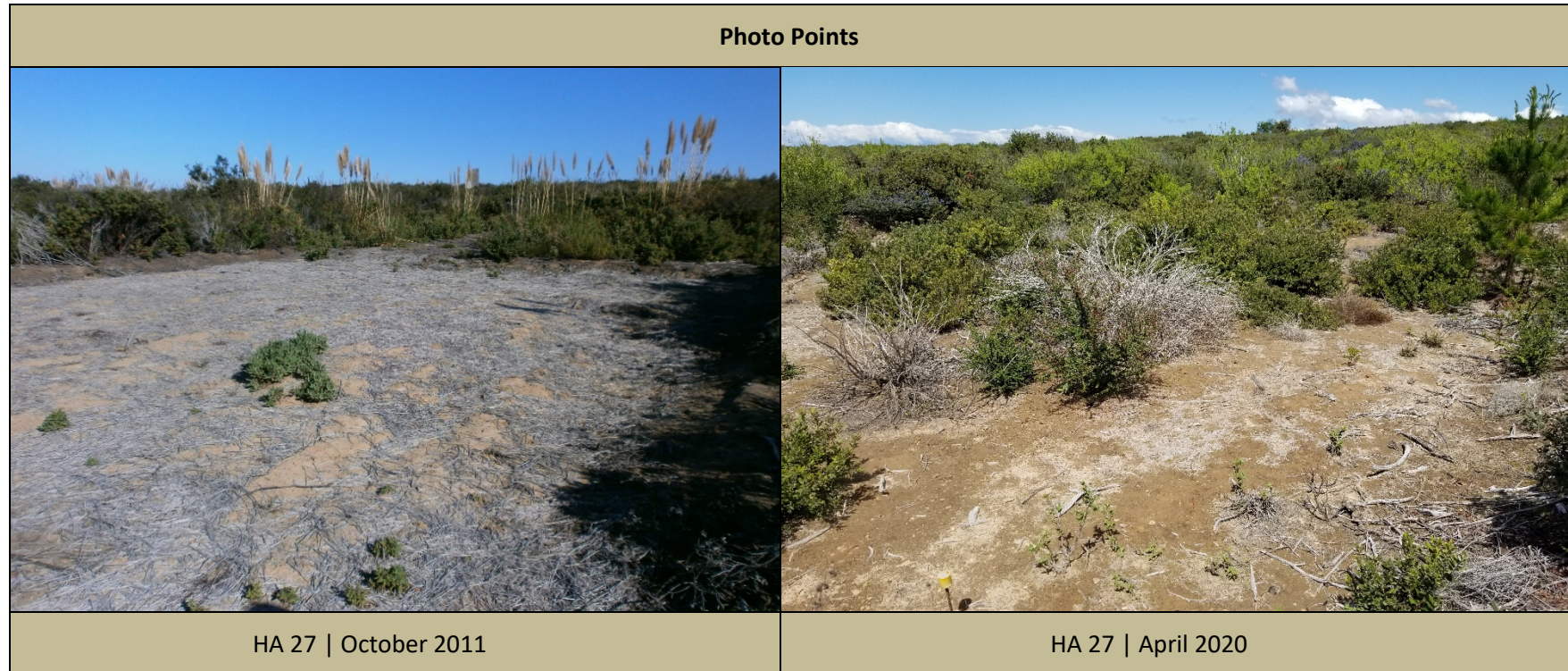


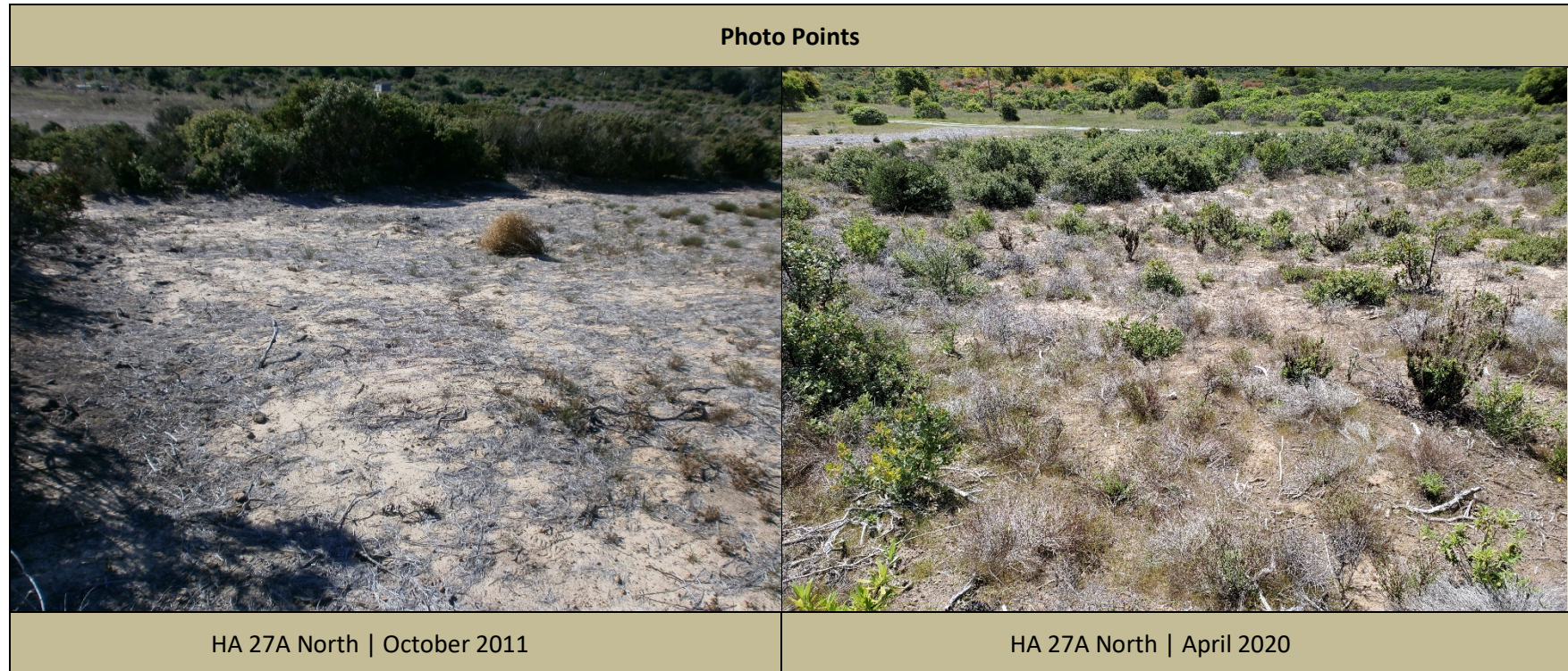


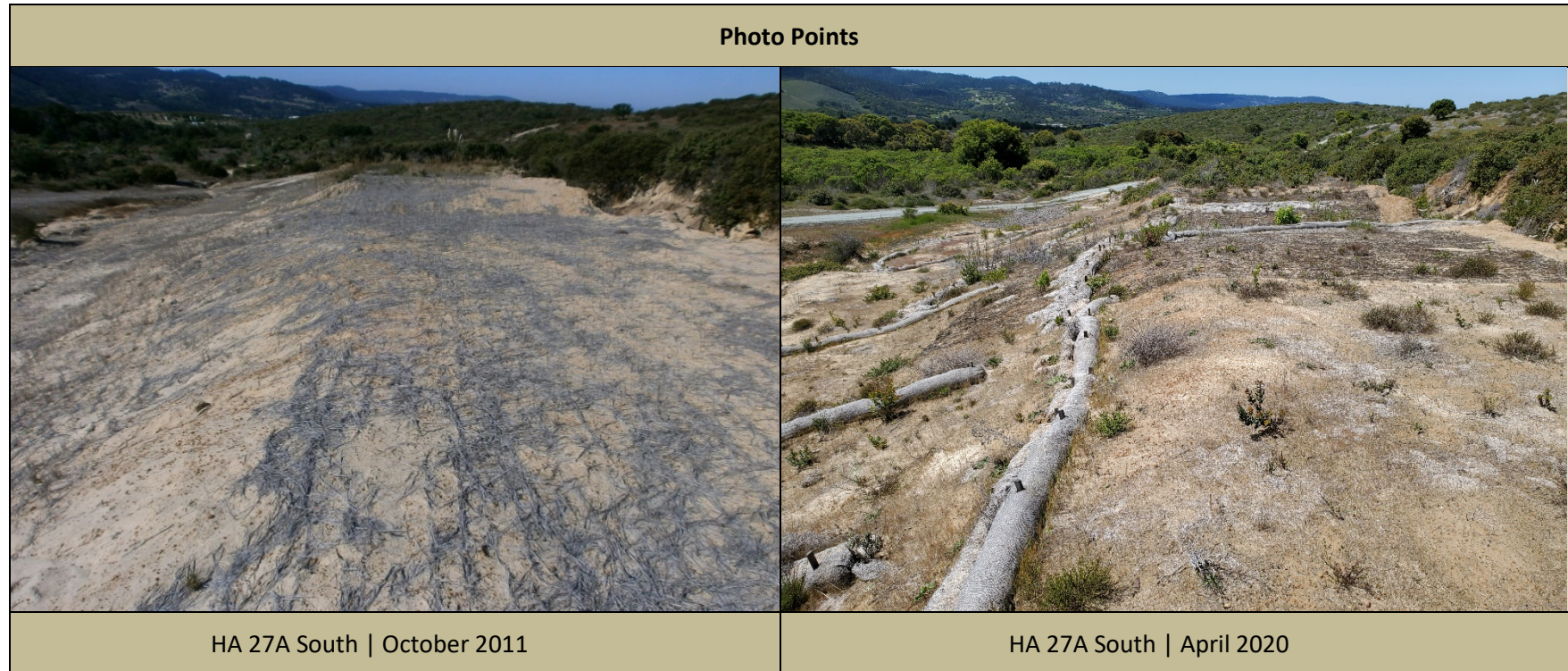


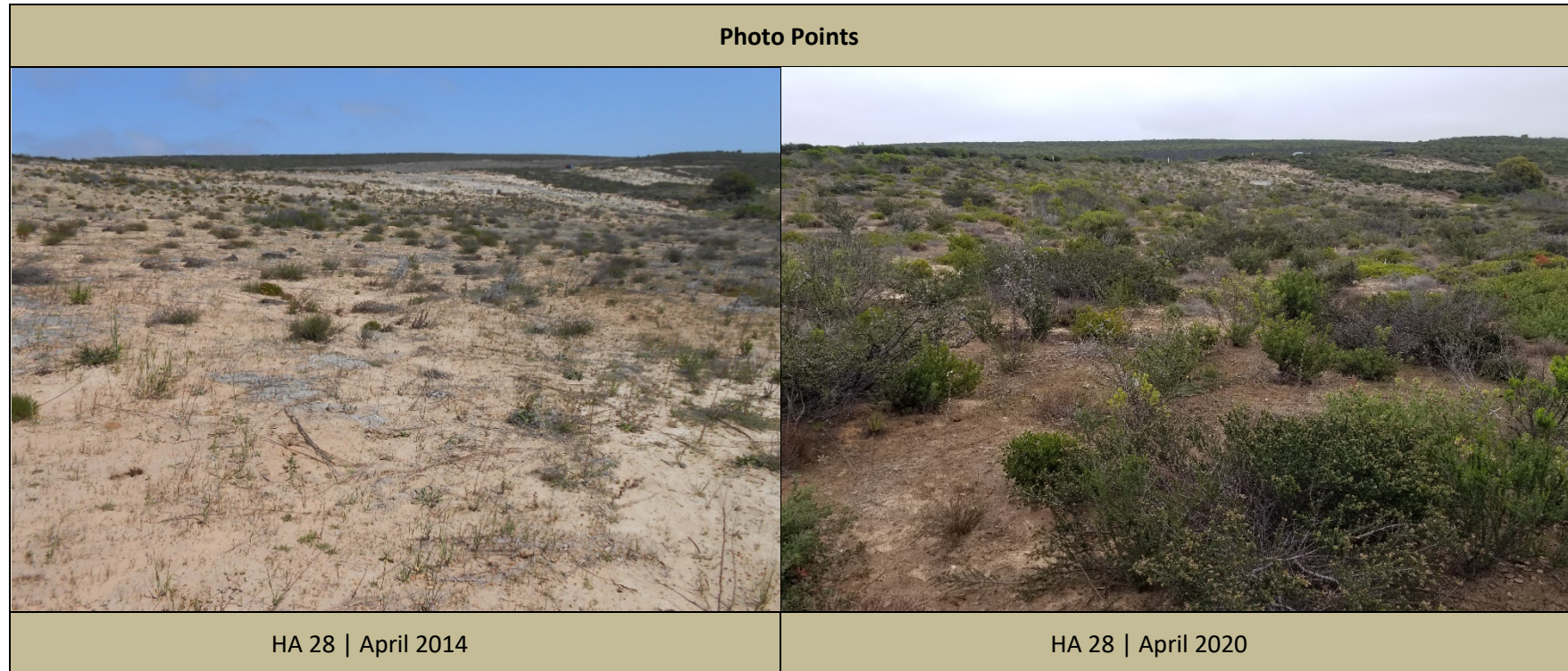


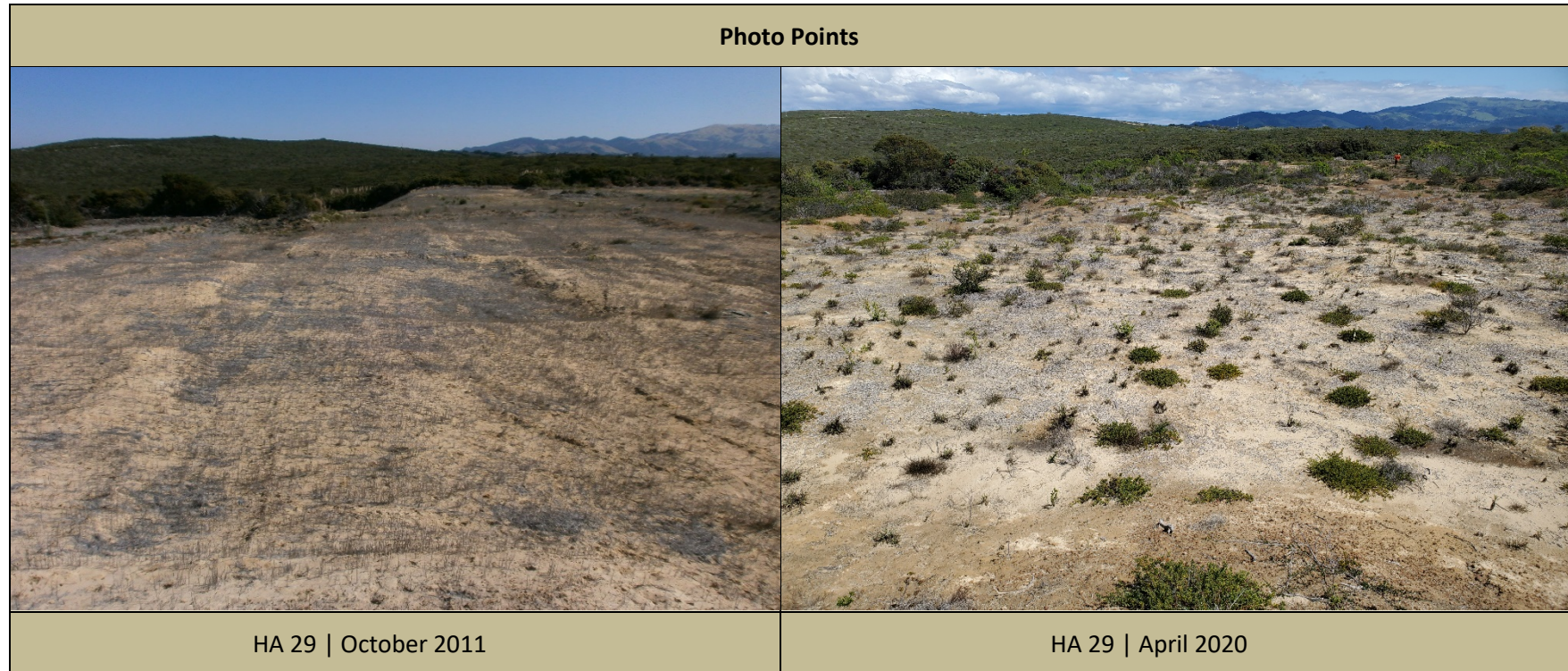












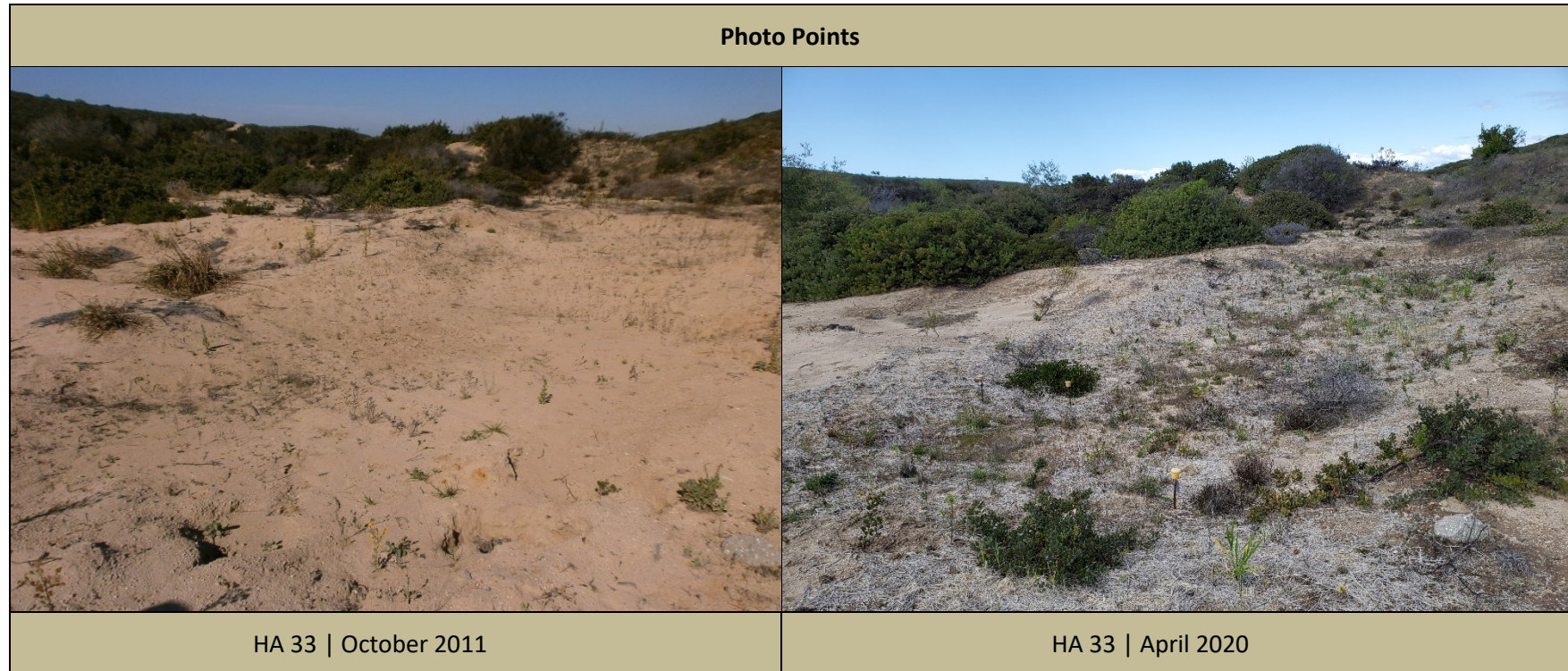


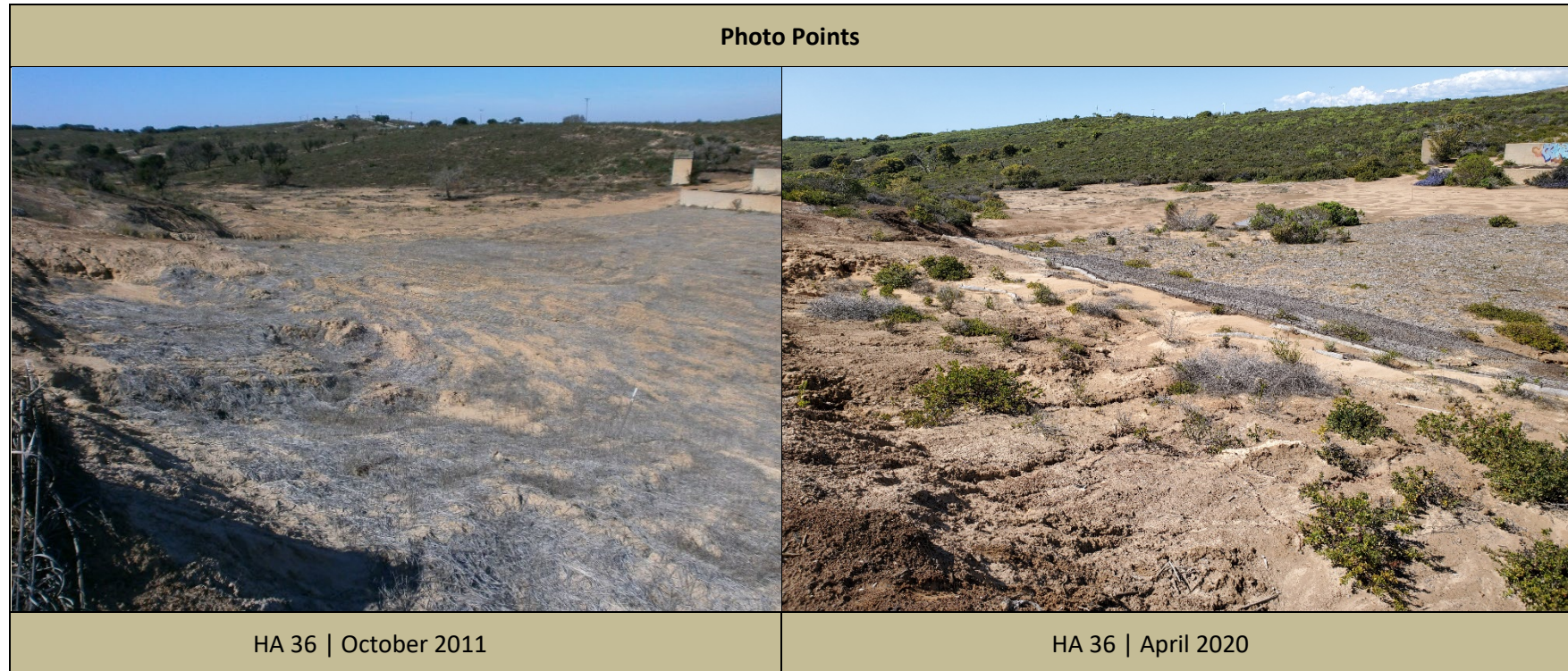
Photo Points



HA 34 | January 2013



HA 34 | April 2020



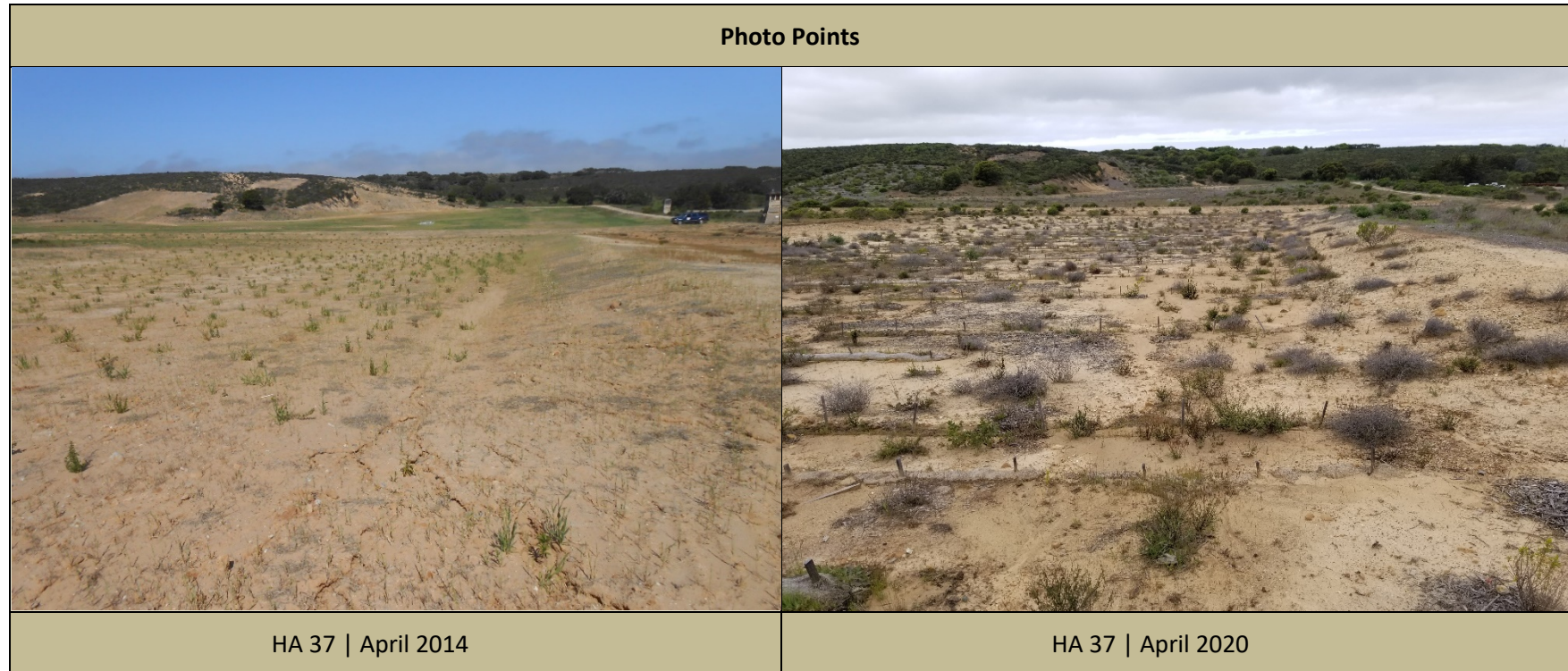


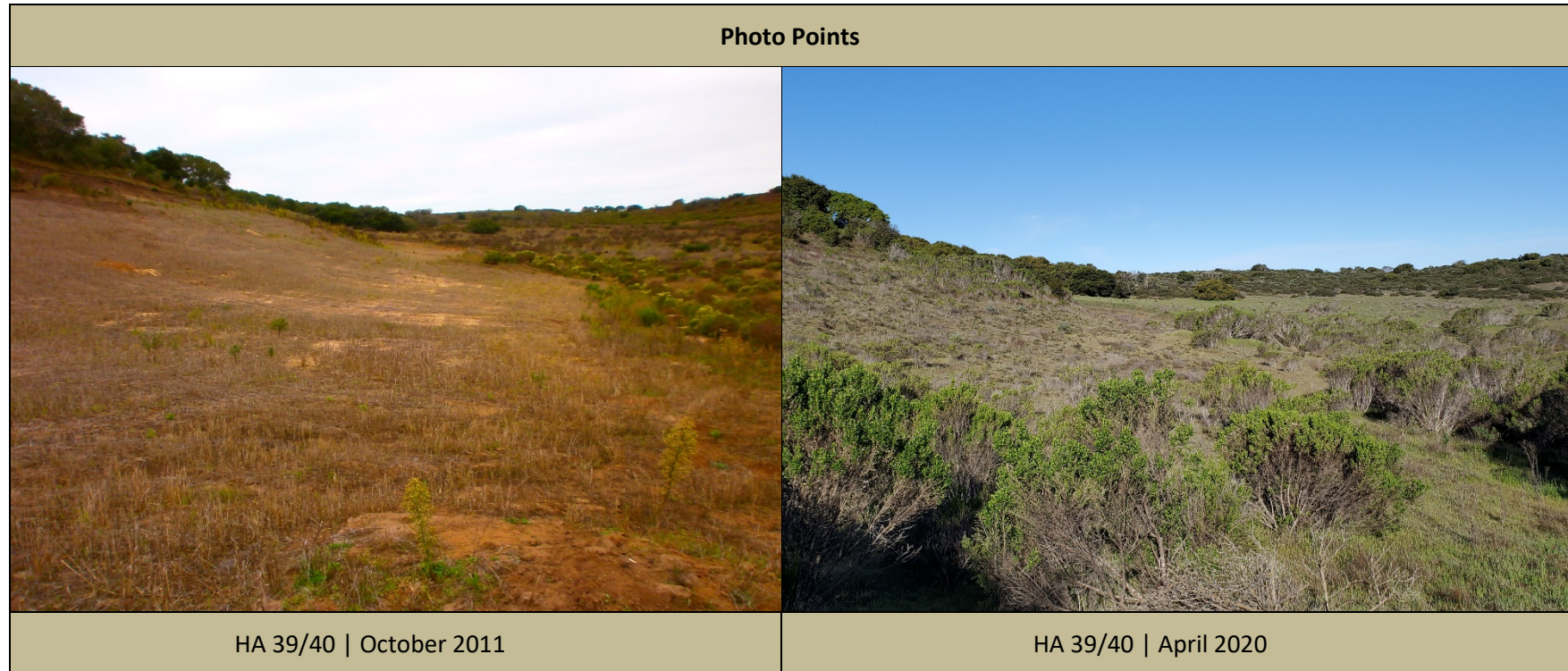
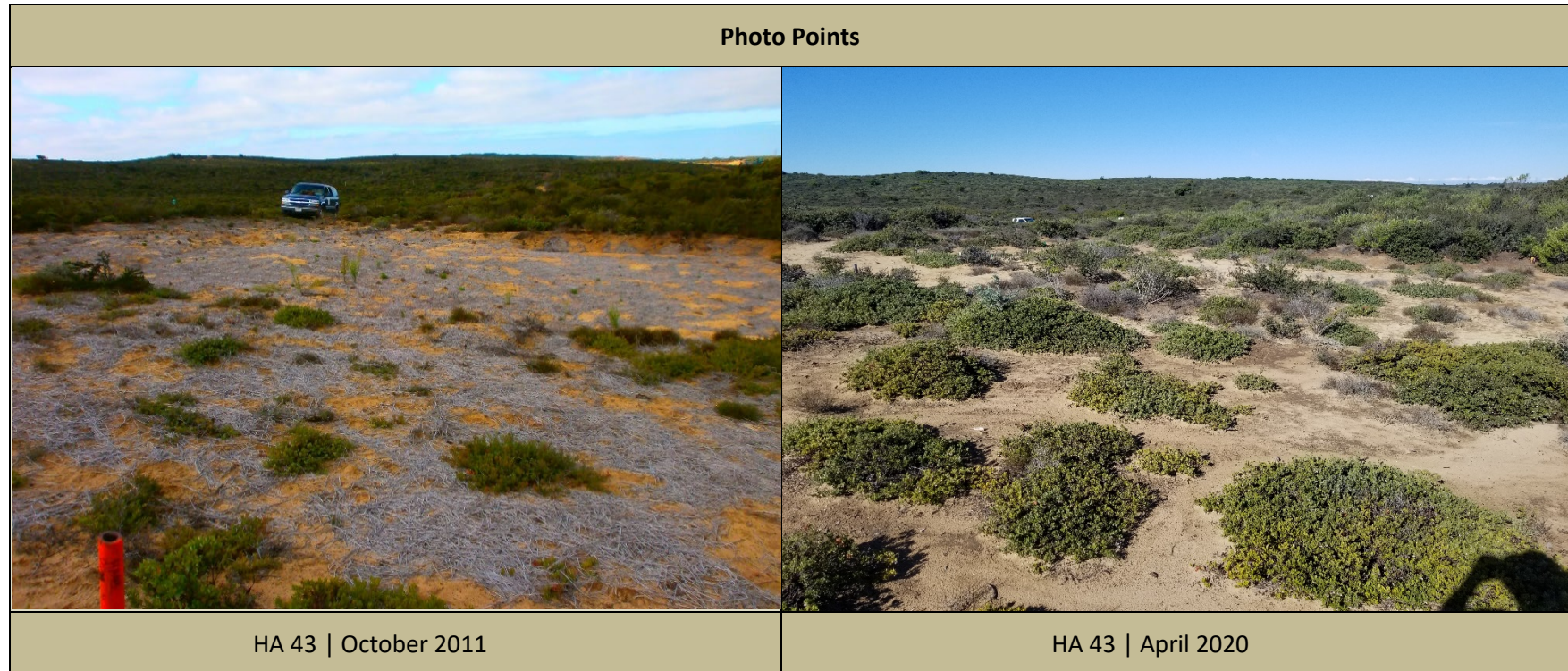
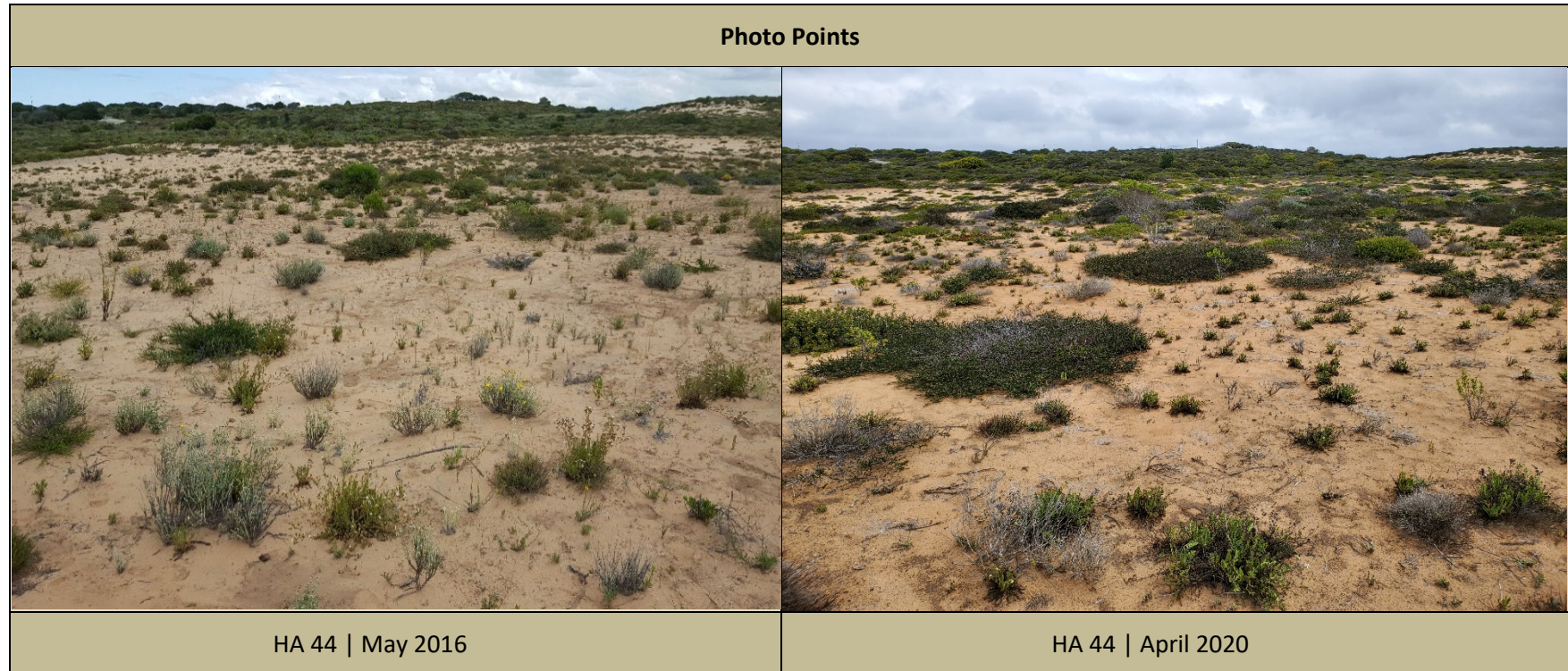
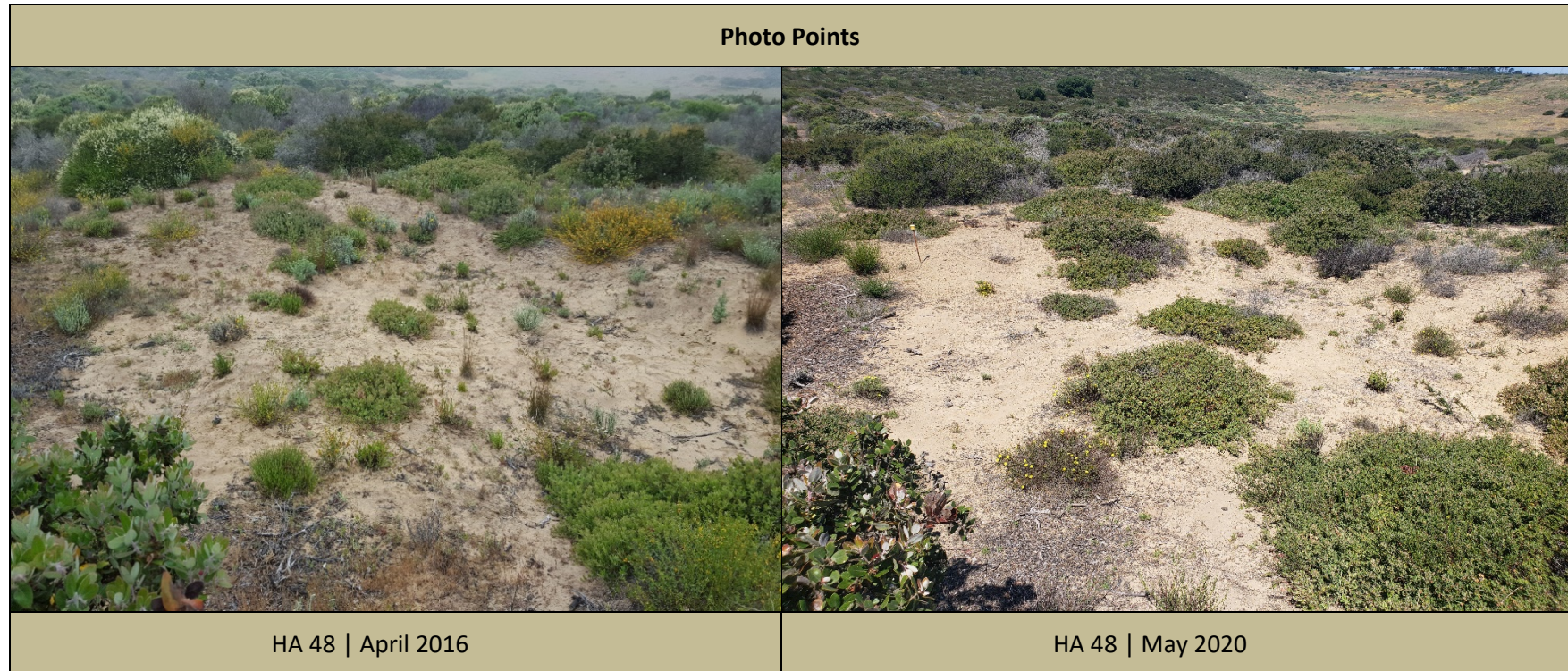


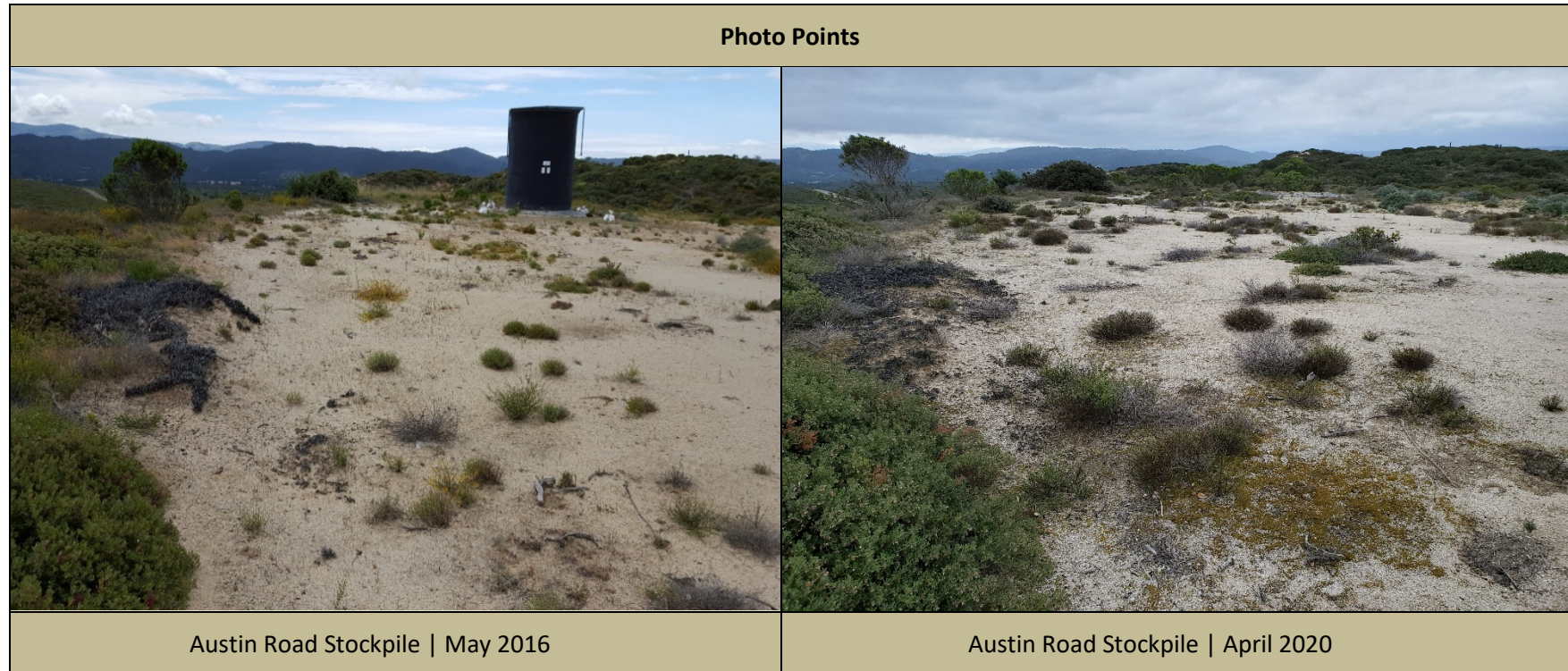
Photo Points	
	
HA 38 April 2014	HA 38 April 2020











APPENDIX E

Photo Points

Time Lapse Series for HAs in Year 5

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Photo Points – HA 26				
				
May 2016		May 2017		May 2018
				
April 2019			April 2020	






Photo Points – HA 48				
				
April 2016		October 2017		May 2018
				
April 2019		May 2020		

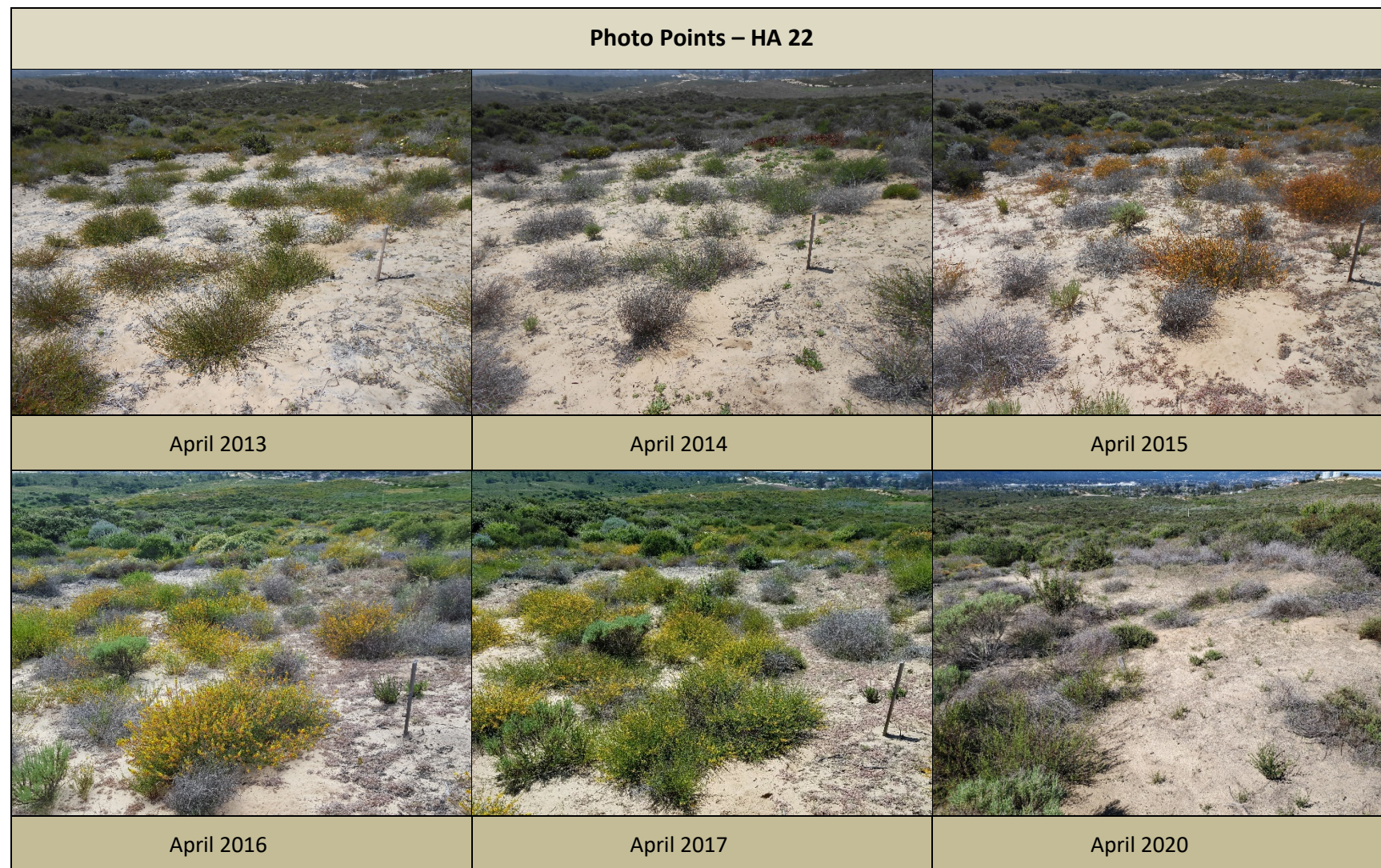
APPENDIX F

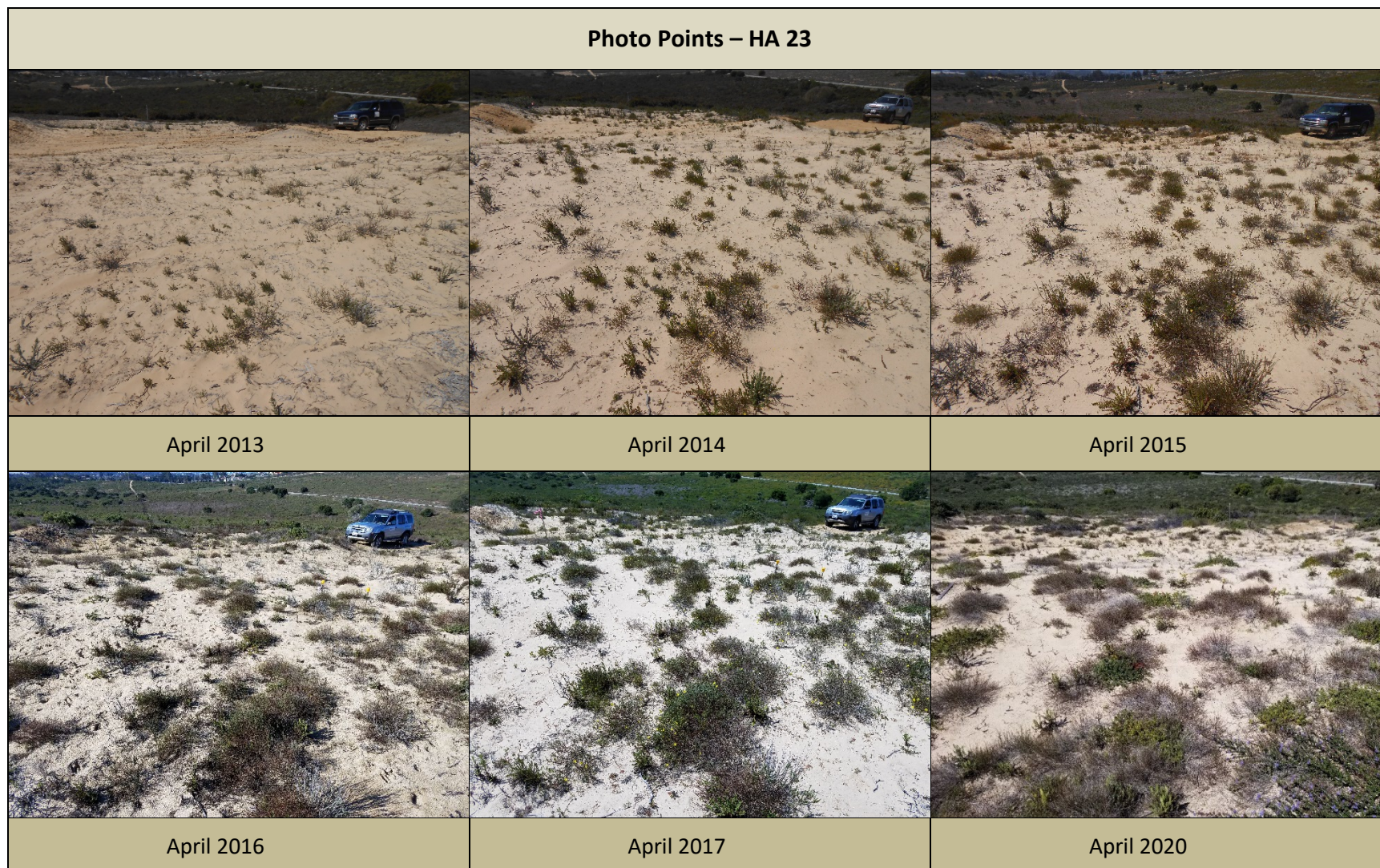
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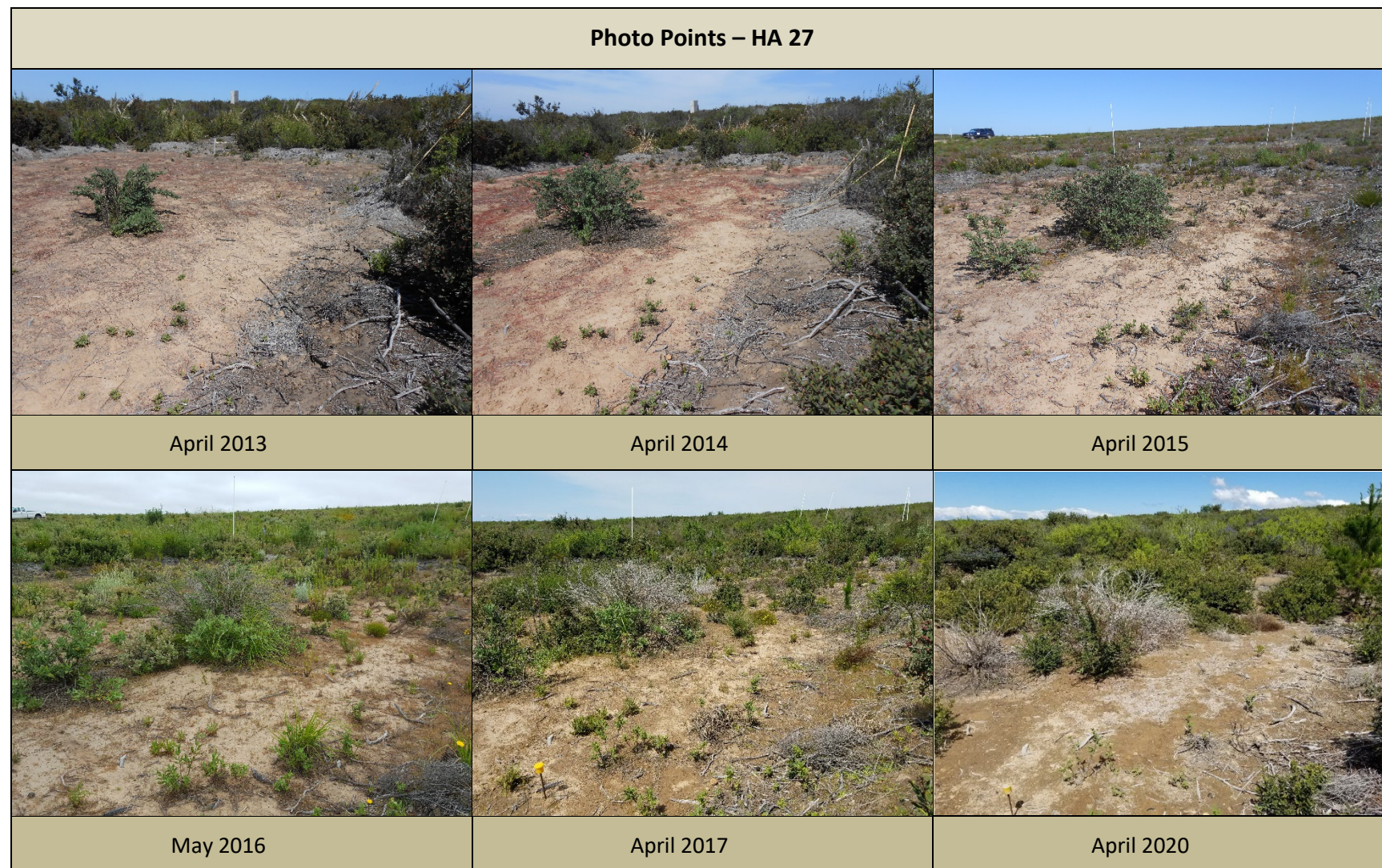
Time Lapse Series for HAs in Year 8

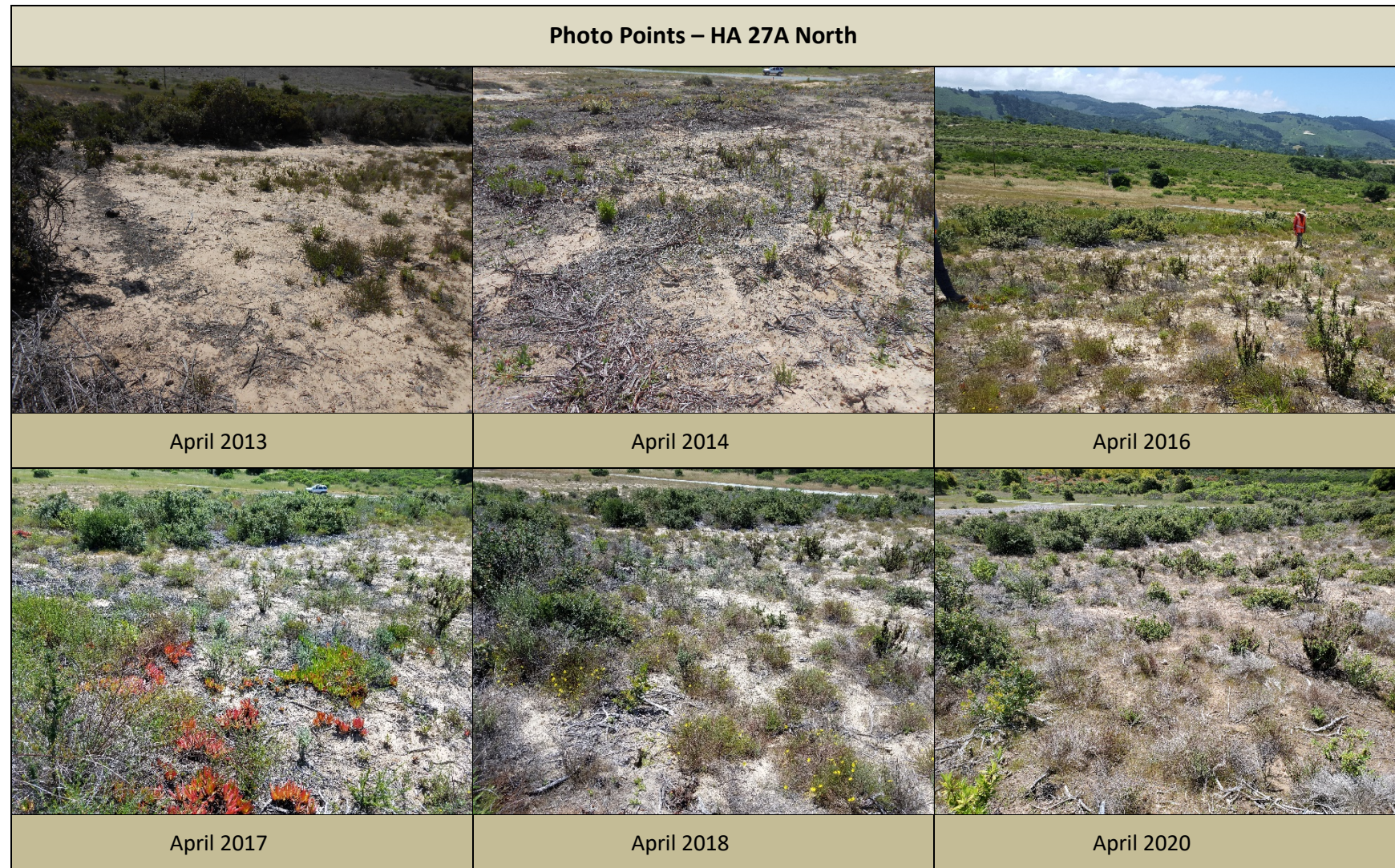
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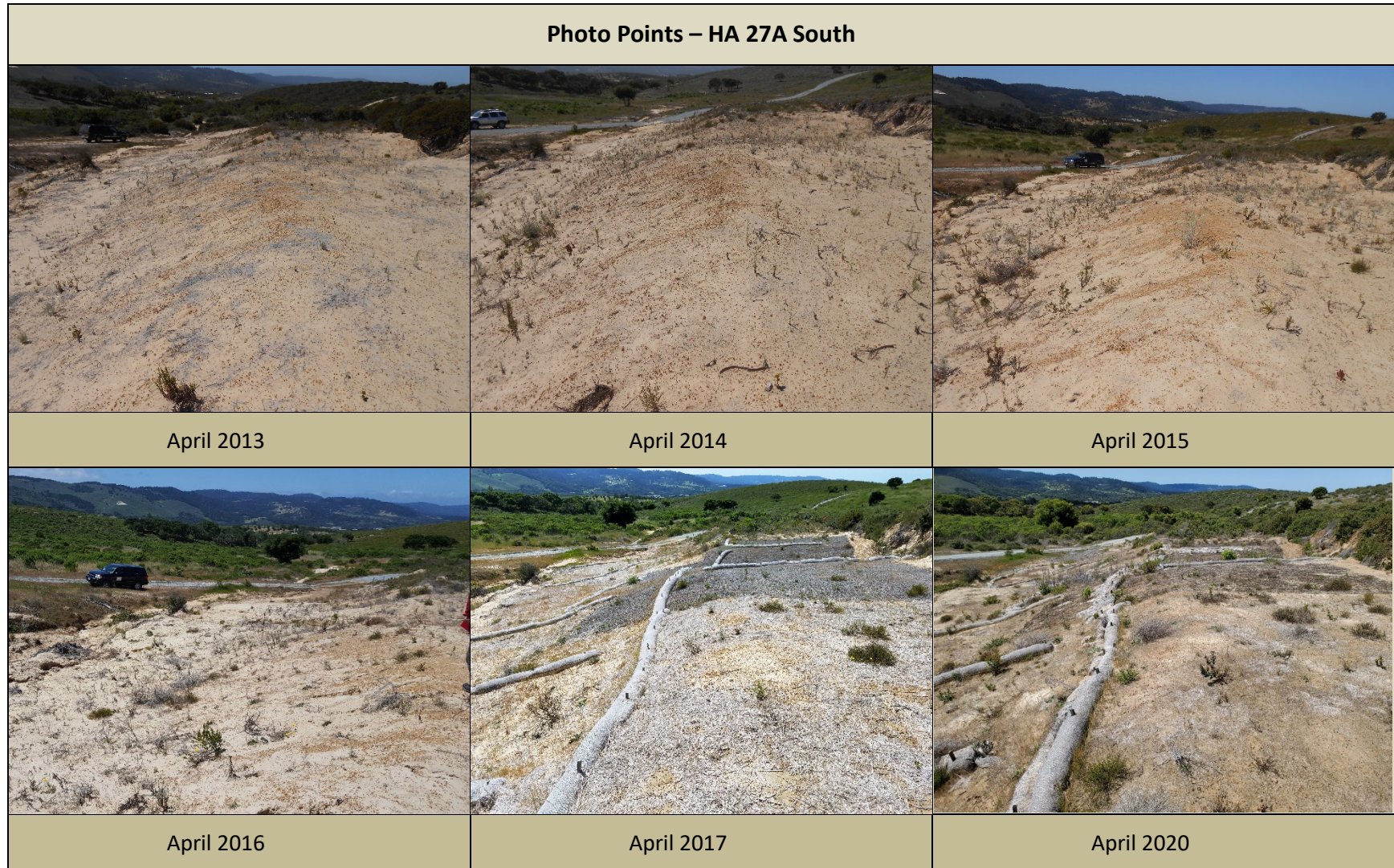
Photo Points – HA 18		
	<p>PHOTO UNAVAILABLE DUE TO UXO CLEANUP</p>	
April 2013	April 2014	April 2015
		
April 2016	April 2017	April 2020











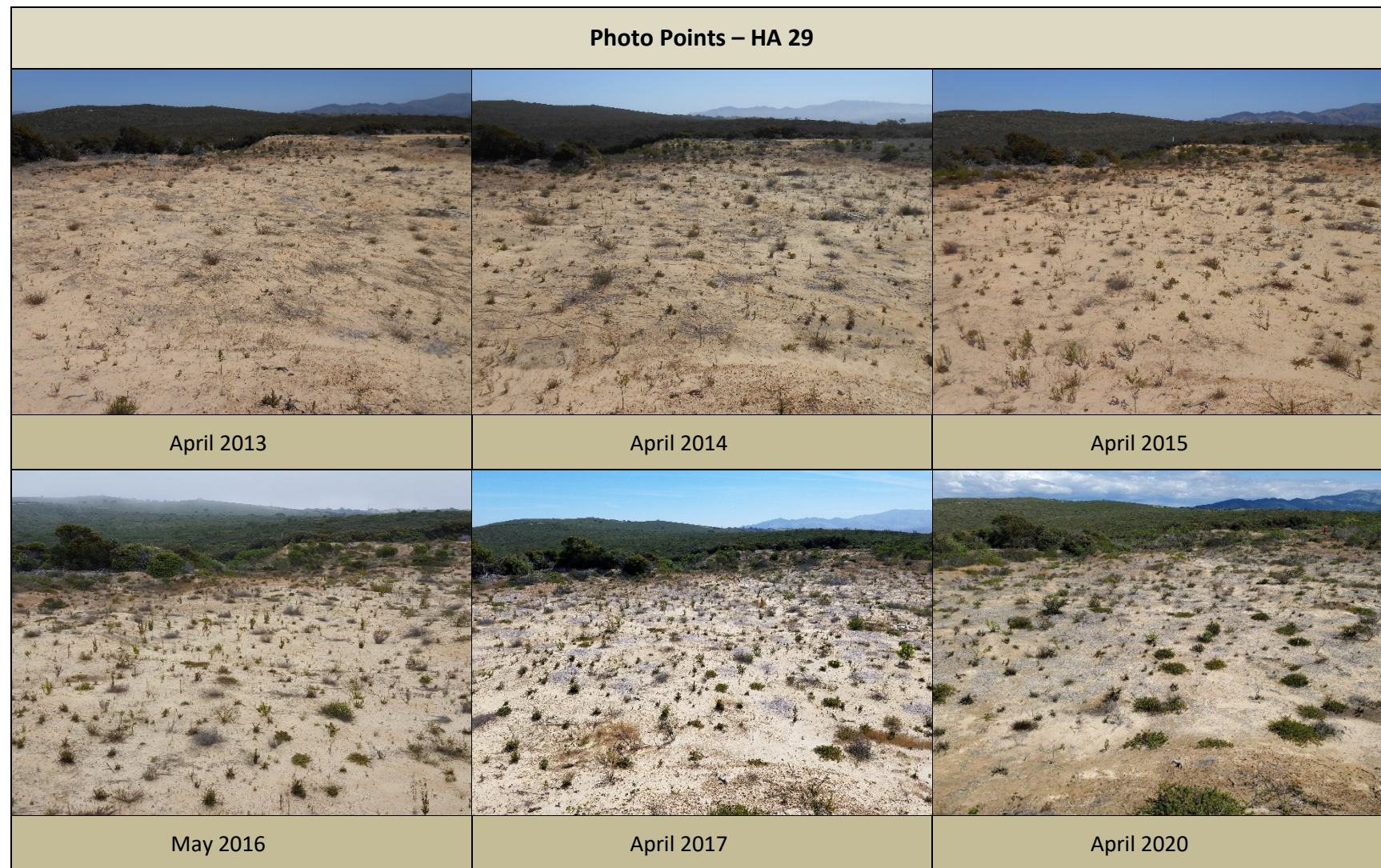








Photo Points – HA 33		
		
April 2013	April 2014	April 2015
		
May 2016	January 2018	April 2020

