

**Meiners et al. 2019. Decades of native bee biodiversity surveys at Pinnacles National Park highlight the importance of monitoring natural areas over time**

## Supporting Information

**S2 Table. Full Pinnacles National Park bee species list, with relative abundance for each of seven collection years, proportion of years collected, and status as new (N) to or absent (A) from the current study.** Species are marked "S" for Singleton if only one specimen was collected, "R" for Rare if  $N \leq 10$ , and "C" for Common if  $N > 10$ . Dashed vertical line marks 2002 collection as separate from original 1996-9 inventory, but still prior to recent study (2011-12).

Bee Taxonomy				Early Inventory		Recent Inventory		New/ Absent in 2011-12			
Family	Genus	Subgenus	Species	1996	1997	1998	1999	2002	2011	2012	Prop. years present
Andrenidae	Ancylandrena		atoposoma	S							0.14 A
	Andrena	(Anchandrena)	quercina			R			R	R	0.43
		(Belandrena)	nemophilae			R			S	R	0.43
			palpalis		R	R					0.29 A
		(Cremandrena)	anisochlora			C			C	R	0.43
		(Dasyandrena)	cristata			R					0.14 A
		(Derandrena)	arctostaphylae			S		S			0.29 A
			californiensis			R		S	S	R	0.57
			n. sp.	S	S	R			R	C	0.71
			vandykei			C		S	S		0.43
			viridissima						R		0.14 N
		(Diandrena)	apasta					S			0.14 A
			chalybioides						S		0.14 N
			cuneilabris						S		0.14 N
			lewisorum	S	R	S	C		C	C	0.86
			nothocalaidis			S					0.14 A
			puthua			R	C		C	R	0.57

	subchalybea	R	R	R	C	C	0.71	
(Erandrena)	principalis	R	R	R	S	R	0.14	A
	astragali	S	R		C		0.57	
	auricoma	R	R	C	R	R	0.71	
	caerulea			C	R	R	0.43	
	chlorura	R	C		R	C	0.71	
	dissimulans	R	C	R	C	C	0.57	
	misella		S				0.14	A
	nigrocaerulea	S	R	R	S	R	0.71	
	suavis			R	C	C	0.43	
	subdepressa			R	R	S	0.43	
(Genyandrena)	mackiae	R	C		R		0.43	
(Hesperandrena)	baeriae	S	S		R	R	0.57	
	compositarum				S	S	0.29	N
	escondida					R	0.14	N
(Holandrena)	cressonii ssp. infasciata	S		S			0.29	A
(Melandrena)	cerasifolii	C	C	C	S	C	1	
	aff. cerasifolii	C	C	C		C	0.71	
	perimelas				S		0.14	A
	sola	R	C	C		C	0.86	
(Micrandrena)	annectens			R			0.14	A
	chlorogaster	R	C		R	C	0.71	
	aff. ishii			C			0.14	A
	microchlora	R	C	S		R	0.71	
	piperi	S	R		S	R	0.71	
(Nemandrena)	crudeni			C	S	C	0.57	
	subnigripes			S			0.14	A
(Oligandrena)	macrocephala	R	C	C	C	C	0.86	
(Parandrena)	concinnula			S		R	0.29	
(Pelicandrena)	atypica	S	R	C	R	R	1	
(Plastandrena)	prunorum			R			0.14	N
(Psammandrena)	congrua	R	R		R	R	0.57	
(Ptilandrena)	pallidiscopa			R		R	0.29	
(Scaphandrena)	lomatii			S			0.14	A
	plana			R			0.14	A
	santaclarae	S	R		R	R	0.57	
(Scoliandrena)	cryptanthae	R			R		0.29	
	osmioides			R		R	0.43	
(Scrapteropsis)	biareola	R	R		C	C	0.14	A
(Simandrena)	angustitarsata	R	R	C	S	R	0.86	
	hypoleuca			R	R	R	0.29	N
	orthocarpi			R		R	0.43	
	pallidifovea	S	R	R	R	R	0.86	
(Thysandrena)	candida	C	C	C	R	C	1	
	knuthiana				S	C	0.43	
	vierecki	S	S				0.29	A

			w-scripta	R	R	C	C	S	0.71	
		(Trachandrena)	fuscicauda			S	R		0.29	A
			semipunctata	R	S			S	0.43	
		(Tylandrena)	subaustralis					S	0.14	N
			subtilis			S			0.14	A
			waldmerei			R			0.14	A
Calliopsis	(Micronomadopsis)	fracta		R	S	R		S	0.57	
			helianthi				R	S	0.29	
			mellipes		S			R	0.29	
			trifolii	R			R		0.29	A
	(Nomadopsis)	anthidia		S	R	R		S	0.71	
			obscurella	R	C	R	R	C	C	R
			zonalis	S	S		S		1	
			smithi	C	C	C	C			S
Macroterea	(Macroteropsis)	arcuata				S		S	0.43	
Panurginus		gracilis				C	R	C	C	C
			melanocephalus	R	R			C	C	0.57
			nigrellus	C	C	C		R	C	C
			aff. occidentalis				S		0.86	
Perdita	(Hesperoperdita)	trisignata ssp. ornata		R	C	C	C	S	S	0.14
	(Perdita)	claypolei ssp. limatula		C	C					A
		hirticeps ssp. hirticeps					S		0.29	
		n. sp. aff. holoxantha						S	0.29	
		isocomae				S			0.14	N
		jucunda				R	S		0.14	A
		linsleyi		R	R	R	S		0.29	A
		rhois ssp. reducta		C	C	C	S		0.71	
		salicis ssp. personata						R	0.71	
	(Pygoperdita)	aureovittata ssp. stenozona				S			0.14	N
		californica				R			0.14	A
		distropica		R	C	C	C	C	C	0.14
		micheneri ssp. micheneri				C	R	S	0.57	
		montereensis		C	C	C	C	S	C	C
		nitens		C	C	R			C	R
Apidae	Anthophora	(Anthophoroides)	californica	R	C	R	R	S	R	R
		(Heliophila)	columbariae							1
			curta	R	R	S	R			
			estebana					R	R	0.14
			flavocincta				S			A
		(Lophanthophora)	pacifica			R	C			0.86
		(Melea)	bomboides	S				S		
		(Mystacanthophora)	urbana	R	C	C	C	S	C	C
		(Paramegilla)	centriformis	R	C	R	C		R	0.14
		(Pyganthophora)	crotchii	R	C	R	R	S	C	C
			edwardsii	R	R	R			C	C
			platti	C	C	C	R		C	C

Anthophorula	(Anthophorisca)	nitens		C	C		C	C	0.57	
	(Anthophorula)	albicans		C	C		S	C	0.71	
Apis		mellifera	R	C	C	C	C	C	1	
Bombus	(Crotchiibombus)	crotchii		C	C	S			0.43	A
	(Fervidobombus)	californicus	R	C	C	R	R	R	1	
	(Pyrobombus)	caliginosus		C			S	S	0.43	
		melanopygus	R	C	C	R	R	C	1	
		vandykei		R	R			R	0.43	
		vosnesenskii	R	C	C	S	S	C	1	
Brachynomad a	(Melanomomada)	melanantha						R	0.14	N
Centris	(Paracentris)	aff. californica		C	C	R			0.43	A
Ceratina	(Ceratina)	arizonensis	C	C	C	C	C	C	1	
	(Euceratina)	dallatorreana			S		R	C	0.43	
	(Zadontomerus)	acantha	S	C	R		R	C	0.86	
		hurdi	S	R	R		R	C	0.86	
		nanula	R	C	C	C	C	C	1	
		aff. nanula	S	R	S		S	R	0.86	
		pacifica		R	S			S	R	0.57
		punctigena	S	C	R	C		R	S	0.86
		sequoiae	R	C	C	C	R	C	1	
		tejonensis		C	R			R		0.43
		timberlakei	R	R	R			R	S	0.71
Diadasia		aff. ochracea	S	S		S	R	C	0.71	
		angusticeps	R	R	C	R	C	C	0.86	
		australis				S	S		0.29	
		bituberculata	R	C	R	C	C	C	1	
		consociata						R	0.14	N
		laticauda	C	C	R	R	C	C	0.86	
		nigrifrons					S		0.14	N
		nitidifrons	R	C	R	R	C	C	0.86	
		rinconis						R	0.14	N
Epeorus		americanus	S	R		S	R	R	0.71	
		compactus			R	S		S	0.43	
		mesillae				S	S	R	0.29	N
		minimus				S	S	S	0.43	
Eucera	(Synhalonia)	actuosa		S	R	R	C	C	0.86	
		amsinckiae	R	R	R		R	R	0.86	
		cordleyi		R	C		S	C	0.71	
		delphinii		C	R	S	S	R	0.86	
		dorsata		C	R	R	S	C	0.86	
		edwardsii	S	R	R		S		0.71	
		lunata			R			R	R	0.43
		venusta ssp. carinata	C	C	C	R		R	R	0.86
		virgata			C	S	S	C	C	0.71
Habropoda		dammersi			R					0.14
		depressa	S	C	C	R	S	C	C	1

		tristissima	R	C	R	S	R	R	C	1	
Melecta	(Melecta)	pacifica	R	R	R		R	R	C	0.43	
		separata		S	R	R	R	C		0.71	
Melissodes	(Melectomimus) (Callimelissodes)	edwardsii	R				S			0.29	
		clarkiae	R				R	R		0.43	
		composita						S		0.14	N
		lupina	R	C		R	C	C		0.71	
		lustra	S		R					0.14	A
		n. sp. 1	R		R					0.29	A
		n. sp. 2	R	R	R	S	R	C		0.86	
		nigracauda		S						0.14	A
		plumosa	R				R	C		0.43	
		stearnsi	R	S			C	C	C	0.71	
	(Eumelissodes)	paulula	R							0.14	A
		velutina						R		0.14	N
	(Melissodes)	tepida						C		0.14	N
Neopasites	(Micropasites)	sp. 4						S		0.14	N
Nomada	(Centriasis)	crotchii spp. crotchii	R	S						0.29	A
		crotchii ssp. nigrior		C			R	R		0.43	
		sp. A	S	R						0.29	A
	(Holonomomada)	edwardsii spp. edwardsii	R	R	R			S		0.43	
		sp. A	R	R	S		R	S		0.71	
		sp. AA	S	S	S			S		0.14	N
		sp. B					R	R		0.71	
		sp. BB					S	R		0.43	
		sp. CC					S	S		0.29	
		sp. D	C	C	C	S				0.57	A
		sp. DD						S		0.14	N
		sp. E	C	R	S	R	R	R		0.86	
		sp. EE					R	R		0.14	N
		sp. F	S		R			S		0.43	
		sp. FF						R	R	0.14	N
		sp. G					R	R		0.29	N
		sp. GG			S			R		0.29	
		sp. HH			S		S			0.29	A
		sp. I			S					0.14	A
		sp. II					R		R	0.29	
		sp. J			S			S		0.29	
		sp. Q	S	S				S		0.43	
		sp. R	R	R						0.29	A
		sp. S	S							0.14	A
		sp. T	S							0.14	A
		sp. U	C	C			R	C		0.57	
		sp. V	S	R	R		R	R		0.86	
		sp. W		C	C			C	C	0.57	
		sp. X			S		R	R		0.43	

			sp. Y	R	S		0.29	A
			sp. Z	C			0.14	A
Oreopasites			aff. hurdi n.sp.	S	S		0.71	
		vanduzeei	R	R	S	S	0.71	
Peponapis	(Peponapis)	pruinosa				R	0.14	N
Townsendiella		ensifera	R	C	C		R	0.57
		rufiventris		S			0.14	A
Triepeolus		heterurus				R	0.14	N
		melanarius				S	0.14	N
		sp. P1				R	0.29	N
		sp. P2				R	0.14	N
		sp. P3				R	0.14	N
		sp. P4	R				0.14	A
		timberlakei	R	R	R	S	0.71	
		aff. timberlakei			S	R	0.29	
Xeromelecta	(Melectomorpha)	californica	R	C	R	R	0.86	
	(Xeromelecta)	larreae	S				0.14	A
Xylocopa	(Notoxylocopa)	tabaniformis ssp. orpifex	R	C	R	R	1	
Colletidae	Colletes	consors	californicus			S	0.14	N
			consors ssp. pascoensis	C	C	R	0.86	
		daleae	aff. algarobiae	S	C	C	0.86	
		simulans	fulgidus ssp. fulgidus	R	R	R	0.57	
			simulans ssp. nevadensis	S			0.14	A
		slevini	R	C	C	R	0.86	
Hylaeus	(Cephalyiaeus)	nunenmacheri		S	R		0.29	A
	(Hylaeus)	bisinuatus	S				0.14	A
		conspicuus		R	R	R	0.43	
		granulatus	C	C	C	S	R	0.86
		mesillae ssp. cressoni	R	C	C	S	C	1
		rudbeckiae	R				R	0.43
		verticalis	R	C	C	C	R	0.86
	(Paraprosopis)	aff. cookii n.sp.	R	R	R			0.43
		calvus	R	C	C	R	C	0.71
		coloradensis	C	C	R			0.43
		n. sp.2	C	R	R	R		0.57
		nevadensis	C	C	C	R	C	0.86
		polifolii	C	C	C	R		0.57
	(Prosopis)	aff. episcopalialis	C	C	C	R	R	0.86
	(Spatulariella)	punctatus			S			0.14
Halictidae	Agapostemon	(Agapostemon)	femoratus		R	R	0.29	
			texanus	R	R	C	C	1
	Augochlorella	(Augochlorella)	pomoniella	R	R		R	0.43
Conanthalictus	(Phaceliapis)	bakeri	S	R	S	R	S	0.71
		seminiger			S		S	0.29
Dufourea		dentipes				S	0.14	N
		leachi	S	S	C	R	C	1

		mulleri	R	R		R		0.43	
		rhamni	R	R	R		S	0.57	
		sandhouseae	C	C		C	C	0.57	
		sparsipunctata	C	C	R	C	C	1	
		virgata	C	R	S	R	R	0.86	
Halictus	(Nealictus)	farinosus	C	C	C	C	C	1	
	(Odontalictus)	ligatus			R	C	C	0.57	
	(Protohalictus)	rubicundus			S			0.14	A
	(Seladonia)	tripartitus	C	C	C	C	C	1	
Lasioglossum	(Dialictus)	albohirtum			R	S	R	0.43	
		brunneiventre	R	R	R		C	0.71	
		diversopunctatum			S		R	0.29	
		hudsoniellum					S	0.29	N
		imbrex	R	C	C		C	0.86	
		cf. impavidum					S	0.14	N
		incompletum	R	R	C	C	C	0.86	
		megastictum			S		R	0.29	
		nevadense	R	C	C	C	C	0.86	
		perichlarum					R	0.14	N
		petrellum			S			0.14	A
		punctatoventre	R	C	C		C	0.86	
		aff. ruidosense	R	R	R			0.43	A
	(Evylaeus)	argemonis	R	C	C	C	C	0.86	
		giffardi				S	C	0.43	
		robustum			S	R	C	0.71	
(Hemihalictus)	aspilurum		S		S		R	0.57	
	glabriventre		R	R	R	C	C	0.86	
	kincaidii		R	R	S	S	R	0.86	
	ovaliceps				S	R		0.43	
	ruficorne		R	R	C	C	C	0.86	
	sequoiae		S		R	C	C	0.71	
	(Lasioglossum)	egregium			S	R	R	C	0.71
		mellipes					R	C	0.43
(Sphecodogastra)	sisymbrii		R	C	C	C	C	1	
	titusi				S	R	C	C	0.57
	allonotum				S		R	R	0.43
	aff. avalonense				S	R	C	C	0.71
	miguelense				S		R	C	0.57
	nigrescens		C	C	C	C	C	0.86	
	sp. 16					R	C	C	0.43
Micralictoides	altadena		S				R		0.29
	ruficaudus		R	R	S		C	R	0.71
Sphecodes	arvensiformis		S	R		S	S	R	0.71
	sp. B		R	C	C	R	R		0.86
	sp. C		R						0.14
	sp. D		R		S	R	R		0.71

			sp. E	S	R	R	C	R	C	C	1	
			sp. F	S	R						0.29	A
			sp. I		S						0.14	A
			sp. J		R						0.14	A
			sp. K		S						0.14	A
			sp. L		S	R	C		R		0.57	
			sp. M							S	0.14	N
Megachilidae	Anthidiellum	(Loyalanthidium)	robertsoni		C	C			R		0.43	
			collectum	R	C	C	C	R	R	R	1	
			edwardsii							R	0.14	N
			jocosum							R	0.14	N
			maculosum		S						0.14	A
	Anthidium	(Anthidium)	mormonum	S	R	S	R				0.57	A
			pallidiclypeum	R	S	R	S	S			0.71	A
			utahense	C	C	C	C	C	C	C	1	
			(Callanthidium)		C	R	R		S	R	0.71	
			illustre						S		0.14	N
Ashmeadiella	Ashmeadiella	(Arogochila)	aff. salviae n. sp. 2									
			australis		R	R	R			S	0.57	
			salviae	R	C	C	R	S	R	C	1	
			timberlakei	C	C	C	C		R	R	0.86	
			(Ashmeadiella)						R	R	0.29	N
	Atoposmia	(Atoposmia)	altadena						R	C	0.29	
			aridula		C	R				R	0.43	
			bucconis		R					R	0.29	
			cactorum ssp. basalis	R	C	C	C	R	R	C	1	
			californica ssp. californica	R	R	R			S	R	0.57	
			difugita ssp. emarginatula		R	R						
			femorata		R		C				0.29	A
			foveata	S	C	C	C		S		0.71	
			gillettei ssp. cismontanica		S	S					0.29	A
			meliloti		C	C					0.29	A
			pronitens		S						0.14	A
			aff. rufitarsis	R	R	R	R				0.57	A
			sonora		R	S		S		R	0.57	
			titusi		C	R	S			S	0.57	
Chelostoma	Chelostoma	(Chelostoma)	n. sp. 2	R	R	S			S		0.57	
			pycognathia		C	R	S				0.43	A
			(Eremosmia)						S		0.14	N
			hemizoniae									
			(Hexosmia)									
			copelandica ssp.									
			copelandica	R	C	R	R	S	R	R	1	
			aff. minutum n.sp.		R	R	R					
			californicum	C	C	C	C	S	C	R	1	
			cockerelli	C	C	C	C	R	C	C	1	

			R	R	S		S		0.57	
		(Boreocoelioxys)	octodentata				R		0.14	N
		(Coelioxys)	hirsutissima	S	R	R	R	R	1	
			serricaudata						0.14	A
		(Cyrtocoelioxys)	gilensis	S					0.14	A
			gonaspis	R					0.14	A
	Dianthidium	(Dianthidium)	dubium ssp. dilectum	C	C	R	R	C	0.86	
			parvum ssp. schwarzi				R	R	0.43	
			pudicum ssp. consimile	S	S	R	R	C	1	
			singulare						0.14	A
			ulkei ssp. ulkei	R	S		S	R	0.57	
	Dioxys		aurifusca	S					0.14	A
			pacifica ssp. pacifica		S		S	R	0.43	
			pomonae ssp. pomonae	R	R	R		C	0.86	
			producta ssp. cismontanica	R	R	R	R	S	0.86	
	Heriades	(Neotrypetes)	occidentalis	C	C				0.29	A
	Hoplitis	(Acrosmia)	aff. emarginata	C	R	R		S	0.57	
		(Alcidamea)	colei	R	C	R	C	C	1	
			grinnelli	R	C	R	R		0.71	
			producta ssp. bernardina		C			C	0.43	
			producta ssp. gracilis	C	C	C	R	C	1	
			sambuci	S	C	R	S		0.71	
		(Cyrtosmia)	hypocrita	S	C	C	R	R	0.86	
		(Hoplitina)	bunocephala	S		S			0.29	A
			howardi	C	C	C	C	R	0.86	
		(Monumetha)	albifrons ssp. maura	C	C	C	C	C	1	
			fulgida ssp. platyura	C	C	C	R	C	1	
		(Penteriades)	remotula	R	C	R		S	0.86	
		(Proteriades)	cryptanthae	R	R		S		0.43	A
			jacintana	C	C	S	R		0.71	
			nanula	R	C	S	R		0.71	
			seminigra	S	C	R	S		0.71	
			semirubra	R	R	R	S	R	1	
	Megachile	(Argyropile)	parallela	S					0.14	A
		(Chelostomoides)	angelarum	C	C			R	0.57	
			davidsoni	C				S	0.43	
			exilis					R	0.14	N
			spinotulata	C	R				0.29	A
		(Eutricharea)	apicalis	C	R		R	S	0.71	
		(Litomegachile)	coquillettii	S	C	C	S	C	1	
			gentilis		R	S			0.43	
			lippiae					R	0.14	N
			onobrychidis		R	S	R	C	0.71	
			texana	S	R	R	R		0.57	A
		(Megachile)	montivaga	R			S	S	0.57	
		(Megachiloides)	gravita	R		C	R	C	0.71	
			pascoensis	R	C	R	C	C	1	

		pseudonigra	S	R		R	R	0.43	
		subnigra ssp. angelica		R		C	R	0.57	
(Sayapis)	(Acanthosmioides)	fidelis	S	R			S	0.43	
		frugalis ssp. pseudoefragalis	C	C		S	C	0.57	
		inimica ssp. jacumbensis	R					0.14	A
		newberryae	R	R				0.29	A
		nigrifrons	S	R				0.29	A
Osmia	(Cephalosmiia)	nigrobarbata	R	S	S	S	R	S	1
		odontogaster	R	C	C	R	R	C	1
		sedula	S	C	R	R	C	R	1
		californica	R	R	S	S	R	R	0.86
		montana ssp. quadriceps	R	R	R	C	S	C	1
		glauca	R	C	C	C	C	C	1
		coloradensis	C	C	R		R	R	0.71
		texana	C	S	R	R	R	R	0.86
		aglaia	R	C	C	C	C	C	1
		atrocyannea	R	C	C	C	C	C	1
		brevis	C	C	C	C	R	C	1
		calla	R	C	C	C	R	C	1
		cara	C	C	C	C	S	C	1
		clarescens	R	C	C	R		R	0.86
		cyanella	C	C	C	C	R	C	1
		cyanopoda	S	C	R	R		S	0.71
		densa	C	C	C	R	R	C	1
(Mystacosmia)	(Osmia)	gabrielis	C	C	C	C	R	C	1
		gaudiosa					R	C	0.43
		granulosa	R	C	C	C	R	C	1
		aff. hesperos					S		0.14
		inurbana			R	R	C	C	0.71
		kincaidii	C	C	C	C	R	C	1
		laeta	R	C	C	R	R	C	1
		malina			S				0.14
		melanopleura	C	C	C	C	R	C	1
		pusilla	R	C		R	R	R	0.86
		aff. pusilla					S		0.14
		raritatis	R	R	R	R		R	0.86
		regulina	R	C	C	C	C	C	1
		rostrata			R				0.14
		sp. P1				R		R	0.29
		tristella	R	S	R				0.43
(Pyrosmia)		vandykei	R	R	R				0.43
		visenda	C	C	C	R	C	C	1
		nemoris	R	C	C	C	C	C	0.86
		lignaria ssp. propinqua	R	C	C	S	R	C	1
		ribifloris ssp. biedermannii	S	S					0.29
		nigricollis					S		0.14

		(Trichinosmia)	<i>latisulcata</i>	R	S	R	C	S	0.71	
Protosmia		(Chelostomopsis)	<i>rubifloris</i>	C	C	C	R	C	1	
Stelis		(Protostelis)	<i>anthidioides</i>	S		R	S	S	0.57	
			<i>hurdi</i>		R	R	R	R	0.71	
		(Stelis)	<i>aff. foederalis n.sp.</i>		S		R		0.43	
			<i>ashmeadiellae</i>		R	R	R	S	0.71	
			<i>calliphorina</i>		R			R	0.14	A
			<i>chemsaki</i>					R	0.14	N
			<i>cockerelli</i>			R		R	0.43	
			<i>interrupta</i>			S		S	0.29	
			<i>lateralis</i>		R	R	R	R	0.57	
			<i>micheneri</i>	S	R	S	R	R	0.57	
			<i>montana</i>	R	R	R	S	R	1	
			<i>nigriventris</i>		R	R			0.29	A
			<i>occidentalis</i>	S	R			S	0.43	
			<i>subemarginata</i>	R	R	R		S	0.71	
Trachusa		(Heteranthidium)	<i>timberlakei</i>	R	C	C	R	R	0.86	
		(Trachusomimus)	<i>perdita</i>	C	C	C	C	C	0.86	
Melittidae	Hesperapis	(Amblyapis)	<i>ilicifoliae</i>	C	C	C	C	C	1	
		(Panurgomia)	<i>regularis</i>	C	C	C	C	C	1	