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Appendix

Region	Total growers*	Region total acreage**	Survey growers	Region survey acreage	% of grower total in census	% of grower total in survey
Sac Valley	1171	206,200	52	18,758	17.9	15.8
NSJV	3731	520,513	189	97,079	57.0	57.4
SSJV	1638	524,157	88	96,579	25.0	26.7

	Total growers in CV	6540	Total respondents	329
*Growers with bearing acreage only	Total CV almond acreage 2017	1,250,870	Total acreage in survey	212,416
**Bearing and non-bearing acreage			% of total CV almond acreage in 2017	17

Table A **Comparison of growers and acreage data between survey and 2017 almond industry census** (USDA-NASS, 2019, 46 and 512). *CV = Central Valley, Sac Valley = Sacramento Valley, NSJV = North San Joaquin Valley, SSJV = South San Joaquin Valley. Data in columns titled "Total growers" and "Regional total acreage" are from the 2017 Census. Only data on growers with bearing acreage were used in column 2 (Total Growers) because they would have required colonies in their orchards during bloom. However, in column 3 (Regional total Acreage) we used the total bearing and non-bearing acreage data because practices such as cover crops, pesticide use, and permanent pollinator habitat could be practiced on all orchard acreage, and this total is reflected in the sum of "Total CV almond acreage 2017." The close percentages of the region totals in the 2017 Census data and our survey data (columns 6 and 7) suggest that our survey sample is regionally representative.*

Acreage ranges	Census %	Survey %
1 to 49	53.2	40.4
50-99	15.8	17.0
100-249	16.8	15.8
259-1000	11.9	15.2
1000+	2.3	11.6
Total #	**7611**	**329**

Table B **Comparison of growers' acreage range data between survey and 2017 almond industry census** (USDA-NASS, 2019, 46). *There were 7611 total almond growers in California (with bearing and non-bearing acreage) in 2017 and 329 respondents in our survey. We used the bearing and non-bearing acreage data because practices such as cover crops, pesticide use, and permanent pollinator habitat could be practiced on all orchard acreage. In the survey, growers who farmed over 250 acres were overrepresented by ~12% compared to 2017 census data, while those who farm 49 acres or less are underrepresented by the same amount. Mid-size growers who farm 50-150 acres are similarly represented. This discrepancy may be because, we had to use census data on the entire almond industry for this comparison, rather than just the Central Valley where there are operations with very large acreage sizes. For example, Kern county has an average operation size of ~655 acres per grower (Table A).*

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	Estimate	Std. Error	Adjusted SE	z value	Pr(>|z|)	Estimate.ci.ub	Estimate.ci.lb	P1
(Intercept)	-1.018	0.692	0.695	1.466	0.143	0.339	-2.375	0.265
CostBeeColoniesModerate concern	-1.24	0.61	0.612	2.025	0.043	-0.045	-2.436	0.095
CostBeeColoniesStrong concern	-1.682	0.583	0.585	2.875	0.004	-0.54	-2.823	0.063
LackAvailableColoniesModerate concern	1.427	0.636	0.639	2.234	0.025	2.674	0.18	0.601
LackAvailableColoniesStrong concern	1.627	0.631	0.634	2.568	0.01	2.864	0.39	0.648
NewRegionNorth San Joaquin	0.196	0.304	0.305	0.642	0.521	0.791	-0.399	0.305
NewRegionSacramento Valley	1.741	0.401	0.403	4.322	0	2.528	0.955	0.673
scale(log(TotalAcreage))	0.211	0.128	0.129	1.642	0.101	0.462	-0.04	0.309
Influential_PCA1	0.307	0.256	0.257	1.193	0.233	0.808	-0.195	0.329
LossNativePollinatorsModerate concern	-0.381	0.416	0.417	0.913	0.361	0.434	-1.196	0.198
LossNativePollinatorsStrong concern	0.146	0.433	0.435	0.337	0.736	0.996	-0.703	0.295
MajorityOwn1	-0.352	0.358	0.359	0.982	0.326	0.348	-1.053	0.203
InfluentialPeopleBeekeeper1	0.219	0.268	0.269	0.816	0.415	0.744	-0.306	0.31

*Table C: **Cover Crops:** Estimates, their standard errors, test statistics, and p-values from the Binomial GLMs of the variables affecting cover crop adoption within past 5 years. Coefficients are on a logit scale. Because most of the variables are categorical, the coefficients estimate the difference between each category and the intercept. The intercept is set as "No concern" for bee concern variables, "Not influential" for each influential person, and South San Joaquin for region. Estimates above zero represent an increase in the probability of cover crop adoption relative to the intercept, and below zero represent a decrease in cover crop adoption relative to the intercept. Total acreage is the only continuous variable, and therefore the coefficient is the estimate of the slope of cover crop adoption for every unit increase in operation size (log). P1 the probability of adoption for each variable level, calculated as the exponent of the estimate + the intercept.*

	Estimate	Std. Error	Adjusted SE	z value	Pr(>|z|)	Estimate.ci.ub	Estimate.ci.lb	P1
(Intercept)	-2.335	1.115	1.119	2.087	0.037	-0.15	-4.521	0.088
CostBeeColoniesModerate concern	1.206	0.851	0.855	1.411	0.158	2.874	-0.462	0.244
CostBeeColoniesStrong concern	0.543	0.833	0.837	0.648	0.517	2.176	-1.091	0.143
HBCStrengthSatisfactionSomewhat satisfied	-0.582	0.421	0.422	1.378	0.168	0.242	-1.406	0.051
HBCStrengthSatisfactionVery satisfied	-1.047	0.413	0.415	2.522	0.012	-0.237	-1.857	0.033
InfluentialPeopleBee_broker1	1.038	0.559	0.562	1.848	0.065	2.135	-0.058	0.215
LossNativePollinatorsModerate concern	0.303	0.543	0.545	0.556	0.578	1.366	-0.761	0.116
LossNativePollinatorsStrong concern	0.991	0.538	0.54	1.834	0.067	2.045	-0.063	0.207
NewRegionNorth San Joaquin	0.55	0.396	0.398	1.382	0.167	1.326	-0.227	0.144
NewRegionSacramento Valley	1.065	0.48	0.482	2.21	0.027	2.006	0.125	0.219
scale(log(TotalAcreage))	0.31	0.153	0.154	2.021	0.043	0.61	0.011	0.117
Influential_PCA1	0.49	0.316	0.317	1.547	0.122	1.109	-0.128	0.136
DecliningBeeHealthModerate concern	1.169	1.146	1.151	1.016	0.31	3.415	-1.076	0.238
DecliningBeeHealthStrong concern	0.532	1.16	1.165	0.457	0.648	2.805	-1.741	0.141
MajorityOwn1	0.216	0.434	0.436	0.495	0.621	1.066	-0.634	0.107

*Table D: **Permanent pollinator habitat**: Estimates, their standard errors, test statistics, p-values and probability of adoption from the Binominal GLMs of the variables affecting permanent pollinator habitat adoption. Coefficients are on a logit scale. The intercept is set as "No concern" for bee concern variables, "Unsatisfied/Prefer not to answer" for honey bee colony (HBC) strength satisfaction, "Not influential" for each influential person, and South San Joaquin for region.*

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	Estimate	Std. Error	Adjusted SE	z value	Pr(>|z|)	Estimate.ci.ub	Estimate.ci.lb	P1
(Intercept)	0.476	0.585	0.587	0.811	0.417	1.623	-0.671	0.617
DecliningBeeHealthModerate concern	-1.725	0.606	0.608	2.838	0.005	-0.538	-2.912	0.223
DecliningBeeHealthStrong concern	-0.755	0.561	0.564	1.34	0.18	0.345	-1.856	0.431
NewRegionNorth San Joaquin	-0.475	0.287	0.288	1.648	0.099	0.088	-1.037	0.5
NewRegionSacramento Valley	-1.094	0.44	0.441	2.479	0.013	-0.232	-1.956	0.35
scale(log(TotalAcreage))	-0.204	0.132	0.132	1.538	0.124	0.055	-0.462	0.568
InfluentialPeopleBeekeeper1	0.257	0.272	0.273	0.942	0.346	0.789	-0.275	0.676
Influential_PCA1	0.097	0.259	0.26	0.372	0.71	0.605	-0.411	0.64

*Table E **Recommended Honey bee BMPs**: Estimates, their standard errors, test statistics, p-values and probability of adoption from the Binominal GLMs of the variables affecting Almond Board's recommended Best Management Practice (BMP) adoption. Coefficients are on a logit scale. The intercept is set as "No concern" for bee concern variables, "Not influential" for each influential person, and South San Joaquin for region.*

	Estimate	Std. Error	Adjusted SE	z value	Pr(>|z|)	Estimate.ci.ub	Estimate.ci.lb	P1
(Intercept)	-0.064	0.379	0.38	0.169	0.866	0.678	-0.807	0.484
HBCStrengthSatisfactionSomewhat satisfied	0.813	0.331	0.332	2.447	0.014	1.462	0.164	0.679
HBCStrengthSatisfactionVery satisfied	1.192	0.318	0.319	3.736	0	1.815	0.569	0.755
Influential_PCA1	-0.628	0.246	0.247	2.544	0.011	-0.146	-1.109	0.334
InfluentialPeopleBee_broker1	-0.933	0.435	0.437	2.138	0.033	-0.081	-1.786	0.269
NewRegionNorth San Joaquin	0.452	0.275	0.276	1.639	0.101	0.99	-0.086	0.596
NewRegionSacramento Valley	0.423	0.372	0.374	1.132	0.257	1.152	-0.306	0.589
scale(log(TotalAcreage))	-0.101	0.118	0.119	0.851	0.395	0.131	-0.333	0.459
LackSkilledBeekeeperModerate concern	-0.549	0.359	0.361	1.523	0.128	0.155	-1.253	0.351
LackSkilledBeekeeperStrong concern	-0.329	0.354	0.355	0.925	0.355	0.365	-1.022	0.403
LackAvailableColoniesModerate concern	-0.455	0.46	0.462	0.987	0.324	0.446	-1.357	0.373
LackAvailableColoniesStrong concern	-0.113	0.442	0.444	0.254	0.8	0.754	-0.979	0.456

*Table F **Legally obligated Honey bee BMPs:** Estimates, their standard errors, test statistics, p-values and probability of adoption from the Binomial GLMs of the variables affecting legally obligated BMP adoption. Coefficients are on a logit scale. The intercept is set as "No concern" for bee concern variables, "Unsatisfied/Prefer not to answer" for honey bee colony (HBC) strength satisfaction, "Not influential" for each influential person, and South San Joaquin for region.*

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	Estimate	Std. Error	Adjusted SE	z value	Pr(>|z|)	Estimate.ci.ub	Estimate.ci.lb	P1
(Intercept)	0.482	0.574	0.576	0.837	0.403	1.607	-0.643	0.618
AnyHabitat1	0.82	0.334	0.335	2.448	0.014	1.475	0.166	0.786
HBCPriceSatisfactionInexpensive	-1.793	0.724	0.726	2.467	0.014	-0.374	-3.211	0.212
HBCPriceSatisfactionA fair price	0.166	0.355	0.356	0.466	0.641	0.861	-0.529	0.657
HBCPriceSatisfactionPrefer not to answer	-0.458	0.402	0.403	1.136	0.256	0.329	-1.245	0.506
InfluentialPeopleBee_broker1	1.249	0.784	0.787	1.588	0.112	2.785	-0.287	0.85
LackAvailableColoniesModerate concern	-0.025	0.525	0.527	0.047	0.963	1.004	-1.053	0.612
LackAvailableColoniesStrong concern	0.944	0.525	0.527	1.789	0.074	1.974	-0.086	0.806
NewRegionNorth San Joaquin	-0.274	0.349	0.351	0.783	0.434	0.41	-0.959	0.552
NewRegionSacramento Valley	1.315	0.652	0.654	2.01	0.044	2.592	0.038	0.858
scale(log(TotalAcreage))	0.296	0.168	0.168	1.758	0.079	0.624	-0.033	0.685
Influential_PCA1	0.316	0.313	0.314	1.007	0.314	0.929	-0.297	0.69
LossNativePollinatorsModerate concern	0.329	0.431	0.432	0.761	0.447	1.173	-0.515	0.692
LossNativePollinatorsStrong concern	0.751	0.482	0.484	1.552	0.121	1.696	-0.194	0.774

*Table G **Interest in a Bee-Friendly Certification:** Estimates, their standard errors, test statisticas, p-values and probability of adoption from the GLMs of the variables affecting bee-friendly certification interest. Coefficients are on a logit scale. The intercept is set as "No concern" for bee concern variables, "Too expensive" for honey bee colony (HBC) price satisfaction, "No" for each influential person", and South San Joaquin for region.*