

**Appendix C**

**Comparison of impervious cover data from U.S. Fish and Wildlife (FWS), SWCA Environmental Consultants (SWCA), and City of Austin (COA).**

Omitted cave locations are shown in gray. Impervious cover percentages were shaded a color based on the following impervious cover categories: High=red, Medium=orange, Low=yellow, and None=green.

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	
Austin blind salamander																	
Parthenia (Main) Spring	76,597	30,998					2,579						3.37				
Eliza Spring	76,615	31,005					2,581						3.37				
Sunken Gardens (Old Mill) Spring	2	1					0						2.86				
Georgetown salamander																	
Avant Spring	8,993	3,639	8,937	3,617			63	25	516	209			0.70	5.77			
Bat Well																	
Buford Hollow Springs	417	169	333	135			1	0	39	16			0.16	11.61			

Watersheds appear similar. New quarry at downstream end of watershed (approximately 200+ acres) accounts for some of the difference. Additional difference in IC acres is likely due to differences in analysis methods.

The difference in watersheds is mostly due to the fact that we went 164 ft (50 m) downstream and picked up another small drainage. The difference in the impervious cover is most likely because there's a new road and quarry [approximately 28 ac (11 ha)] that we did not have in our analysis. Additional difference in IC acres is likely due to differences in analysis methods.

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares					
Cedar Breaks Hiking Trail Spring	207	84	211	86			0	0	47	19			0.16	22.14		Watersheds appear similar. Two more roads and a new quarry [approximately 33 ac (13 ha)] in upper watershed. Additional difference in IC acres is likely due to differences in analysis methods.	
Cedar Hollow Spring	121	49	69	28			0	0	5	2			0.08	6.94		The difference in watershed size most likely due to slightly different point location and the fact that we went 164 ft (50 m) downstream and included an extra small ephemeral stream. A large lot development our layer didn't pick up is likely the reason for difference in impervious cover. Difference in watershed size most likely due to slightly different point location and the fact that we went 164 ft (50 m) downstream of the site, picking up an extra small ephemeral stream.	
Cobb Springs	535	216	454	184			0	0	0	0			0.01	0.04			
Cobb Well																	
Cowan Creek Spring	6,660	2,695	6,515	2,636			61	25	526	213			0.92	8.08		Watersheds appear similar. The difference in impervious cover is somewhat explained by an additional high density subdivision in the watershed (about 700 ac (284 ha) of new development). Other differences likely due to differences in analysis methods.	
Knight (Crockett Garden) Spring	7	3	7	3			0	0	0	0			0.00	4.09		Watersheds appear similar. Difference in impervious cover is likely due to differences in analysis methods.	
San Gabriel Spring	258,017	104,416					2,013	815					0.78				
Shadow Canyon Spring	25	10	24	10			0	0	1	0			0.74	3.02		Watersheds appear similar. Difference in impervious cover acres is likely due to differences in analysis methods.	

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares					
Swinbank Spring	9	4	19	8			1	0	4	2			6.90	20.53		<p>Watersheds are slightly different due to different methods of delineation. Difference in IC acres is likely due to differences in analysis methods.</p> <p>The difference in watersheds is due to the fact that we went 164 ft (50 m) downstream. Difference in IC acres is likely due to differences in analysis methods. Our point is more than 1,640 ft (500 m) from theirs, so the watersheds are not comparable.</p>	
Twin Spring	78	32	72	29			3	1	10	4			3.45	14.27			
Walnut Spring	1	0	196	79			0	0	13	5			0.00	6.85			
Water Tank Cave																	
Jollyville Plateau salamander																	
1	1,736	703			1,736	703	124	50			127	51	7.14		7.32	<p>Watersheds appear similar. There is some difference in impervious cover acres due to an additional development that was not reflected in our analysis [~68 ac (28 ha)]. The rest of the difference in impervious cover acres is likely due to differences in analysis methods.</p>	
2	1,659	671			1,658	671	124	50			127	51	7.48		7.65		
3, Lanier Spring	1,604	649	1,565	633	1,604	649	124	50	209	84	127	51	7.73	13.34	7.90		
4	1,688	683			1,688	683	124	50			127	51	7.35		7.52		
5	648	262			648	262	61	25			66	27	9.45		10.14		
6	243	98			243	98	39	16			41	17	15.99		16.80		
9	215	87			215	87	43	18			43	18	20.27		20.26		
10	235	95			235	95	43	18			43	18	18.50		18.50		
12	293	119			293	118	43	18			44	18	14.84		15.04		
13	411	166			411	166	43	18			45	18	10.58		10.88		

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres		
14, Lower Ribelin	520	210	521	211	519	210	43	18	106	43	45	18	8.37	20.39	8.69	Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream of the site. There is some difference in impervious cover acres due to an additional development that was not reflected in our analysis [-68 ac (28 ha)]. The rest of the difference in IC acres is likely due to differences in analysis methods.	
15	17	7		17	7	0	0			0	0	0.00		0.00			
16	15	6		15	6	0	0			0	0	0.00		0.00			
17	788	319		788	319	151	61	147	60	19.16		18.67					
20	11	5		11	5	0	0	3	1	0.28		24.90					
21	188	76		188	76	51	21	48	19	26.93		25.50					
22	31	13		31	12	13	5	10	4	40.60		33.06					
24	74	30		73	30	4	1	6	2	4.95		8.18					
25	467	189		469	190	0	0	1	0	0.00		0.16					
Audubon Spring	23	9	10	4	23	9	0	0	0	0	0	0	0.00	0.00	0.00	The difference in watersheds is due to the fact that their point was more than 32 ft (10 m) from ours and we went 164 ft (50 m) downstream of the site.	
Avery Deer Spring	246	100	250	101	246	99	43	18	54	22	48	19	17.66	21.72	19.40		
Avery Springhouse Spring	24	10			25	10	11	5			9	4	45.60		36.87	The difference in watersheds is due to the fact that their point was more than 328 ft (100 m) downstream from ours. The difference in impervious cover acres is likely due to differences in analysis methods.	
Baker Spring	79	32	9	4	79	32	0	0	0	0	1	0	0.41	0.46	1.06		
Balcones District Park Spring	2,256	913			2,256	913	756	306			916	371	33.50		40.63	Our point is about 66 ft (20 m) from theirs and on the creek with a much larger watershed, so the watersheds are not comparable.	
Barrow Hollow Spring	183	74			184	74	22	9			51	21	12.19		27.68		

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares					
Barrow Preserve Tributary	124	50	123	50	124	50	13	5	30	12	39	16	10.76	24.05	31.63	Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream of the site. The difference in impervious cover acres is likely due to differences in analysis methods.	This is a recently added site that COA did not analyze.
Blizzard 2, Blizzard 3	6	3											0.00				
Blizzard (R-Bar-B) Spring	1,538	622			1,554	629	159	65			152	61	10.36		9.75		
Bluewater Cave No. 1																	
Bluewater Cave No. 2																	
Broken Bridge Spring	270	109			269	109	62	25			67	27	22.87		24.94		
Brushy Creek Spring	49,784	20,147			49,774	20,143	6,969	2,820			7,736	3,131	14.00		15.54		
Bull Creek at Lanier Tract	660	267			659	267	43	18			45	18	6.59		6.84		
Bull Creek Spring Pool	1,743	705			1,742	705	124	50			127	51	7.12		7.30		
Bull Creek Tributary 5 (2), Bull Creek Tributary 5 (3)	773	313					149	60					19.23				
Buttercup Creek Cave																	
Canyon Creek, Bull Creek Tributary 6 (3)	1,186	480			1,185	480	238	96			296	120	20.11		24.99		
Canyon Creek Hog Wallow Spring	726	294			726	294	61	25			66	27	8.43		9.05		
Canyon Creek Pope and Hiers	851	344			851	344	167	68			219	89	19.67		25.71		
Cistern (Pipe) Spring	3	1			4	1	0	0			0	0	0.00		0.00		
Concordia Spring X	17	7			17	7	2	1			3	1	13.53		20.63		
Concordia Spring Y	322	130			322	130	41	17			46	19	12.89		14.37		
Downstream of Small Sylvia Spring 1	1,369	554											21.88				
Downstream of Small Sylvia Spring 2	1,364	552											21.94				
Fern Gully	151	61			150	61	41	16			41	17	26.93		27.55		
Flea Cave																	
Franklin 2	1,832	742					124	50					6.77				

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres		
Franklin, Franklin 3	1,829	740			1,829	740	124	50			127	52	6.77		6.97	<p>Difference in watersheds is due to the fact that their point was about 262 ft (80 m) upstream from ours. The difference in impervious cover acres is likely due to differences in analysis methods.</p> <p>This is a site that COA did not analyze.</p> <p>The difference in watersheds is due to the fact that their starting point was about 3281 ft (1000 m) upstream from ours. The difference in impervious cover acres is likely due to differences in analysis methods.</p> <p>Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream. The difference in impervious cover acres is likely due to differences in analysis methods.</p>	
Gardens of Bull Creek	2,099	849			2,098	849	394	159			450	182	18.76		21.43		
Gaas Spring	24	10			24	10	0	0			0	0	0.15		1.96		
Godzilla Cave																	
Hamilton Reserve West	554	224			553	224	81	33			82	33	14.55		14.73		
Hearth Spring	719	291			720	291	162	66			228	92	22.58		31.67		
Hideaway Cave																	
Hill Marsh Spring	146	59	138	56	146	59	15	6	22	9	15	6	10.21	16.08	10.03		
Horsethief, 18	7	3			7	3	0	0			0	0	0.00		0.00		
House Spring	93	38			93	37	24	10			23	9	25.96		25.01		
Hunter's Lane Cave																	
Ilex Cave																	
Indian Spring	111	45					12	5					11.13				
Ivanhoe Spring 2	11	5			11	4	0	0			0	0	0.00		0.00		
Kelly Hollow Springs	254	103			253	103	59	24			61	25	23.23		24.07		
Kretschmarr Salamander Cave																	
Krienke Spring	3,235	1,309	3,085	1,248	3,233	1,308	283	114	562	227	396	160	8.74	18.22	12.25		
Lanier 90-foot Riffle	814	329		0	813	329	81	33			82	33	9.89		10.04		
Little Stillhouse Hollow Spring	26	11			26	11	5	2			6	3	20.46		24.24		
Long Hog Hollow Tributary Below Fire Oak	191	77	182	74	191	77	47	19	46	19	57	23	24.78	25.15	29.71		
MacDonald Well	535	217			535	217	42	17			44	18	7.82		8.21		
Moss Gully	26	11			27	11	0	0			0	0	0.00		0.00		

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres		
PC Spring	1,630	660	1,507	610	1,631	660	190	77	344	139	218	88	11.68	22.82	13.39	<p>The difference in watersheds is somewhat due to the fact that their point was over 1312 ft (400 m) downstream from ours. Slightly more development [~ 45 ac (18 ha)] shows up in SWCA's analysis than ours. The rest of the impervious cover acres difference is likely due to differences in analysis methods.</p> <p>This is a recently added site that COA did not analyze.</p> <p>Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream of the site. We were about 66 ft (20 m) different in locations as well. The difference in impervious cover acres is likely due to differences in analysis methods.</p> <p>This is a recently added site that COA did not analyze.</p>	
Pit Spring	1,823	738			1,822	737	124	50			127	52	6.80		6.99		
Ribelin	12	5			12	5	0	0			0	0	0.00		0.00		
Ribelin 2	416	168					43	18				0	10.46				
Ribelin / Lanier	578	234			578	234	43	18			45	18	7.53		7.81		
Salamander Cave																	
Salamander Squeeze Cave																	
SAS Canyon	68	28			68	28	8	3			11	4	11.64		15.99		
Schlumberger Spring #1, 19	58	24			58	23	16	6			14	5	27.03		23.45		
Schlumberger Spring #2	86	35			85	35	17	7			15	6	19.82		18.06		
Sierra Spring	347	140			347	141	69	28			120	48	19.96		34.47		
Small Sylvia Spring	1,241	502			1,240	502	274	111			361	146	22.09		29.07		
Spicewood Spring (USGS), Spicewood Tributary	377	152	368	149	376	152	116	47	149	60	177	71	30.75	40.50	47.01		
Spicewood Park Dam	259	105			259	105	46	19			63	26	17.96		24.47		
Spicewood Valley Park Spring, Sylvia Spring Area 4	855	346			855	346	180	73			242	98	21.03		28.25		
Stillhouse Hollow	44	18					11	5					25.20				

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres		
Stillhouse Hollow Spring	9	4			9	4	1	0			2	1	11.26		19.83		
Stillhouse Hollow Tributary	67	27	57	23	67	27	13	5	12	5	19	7	19.83	20.78	27.48	Watersheds appear slightly different due to the fact that we went 164 ft (50 m) downstream of the site and we picked up more area on the eastern side. The difference in impervious cover acres is likely due to differences in analysis methods.	
Stillhouse Tributary	63	25			63	26	13	5			18	7	20.96		28.31		
Sylvia Spring Area 2, Sylvia Spring Area 3	839	340					175	71					20.83				This is a recently added site that COA did not analyze
Tanglewood 2	64	26											32.05				This is a recently added site that COA did not analyze
Tanglewood Spring, Tanglewood 3	141	57	148	60	137	55	42	17	47	19	50	20	30.03	31.69	36.21	Watersheds appear slightly different due to the fact that we went 164 ft (50 m) downstream and we added Tanglewood 3 just downstream from Tanglewood Spring. The difference in impervious cover acres is likely due to differences in analysis methods.	The watershed is different because COA used our Tanglewood Spring watershed before we added the recent site, Tanglewood 3.
Testudo Tube																	
Three Hole Spring	645	261					61	25					9.49				This is a recently added site that COA did not analyze
Treehouse Cave																	
Tributary Downstream of Grandview	101	41			100	41	8	3			11	5	7.89		11.26		
Tributary No. 3	640	259	633	256	640	259	136	55	145	59	154	62	21.34	22.92	24.10	Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream. The difference in impervious cover acres is likely due to differences in analysis methods.	
Tributary 4 shaft - upstream	1,445	585			1,445	585	314	127			409	166	21.75		28.30		

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	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres		
Tributary 4 shaft - downstream	1,595	646			1,596	646	337	136			445	180	21.11		27.91	<p>Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream of the site. SWCA's analysis includes an additional ~20 ac (8 ha) of development not reflected in our analysis</p> <p>Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream of the site. The difference in impervious cover acres is likely due to differences in analysis methods.</p> <p>We could not match this site with any known Jollyville Plateau salamander sites.</p> <p>Watersheds appear similar; slight difference due to the fact that we went 164 ft (50 m) downstream of the site and SWCA's point is an additional 164 ft (~50 m) upstream from ours. The differences in impervious cover calculations partially attributable to new apartment complex [~15 ac (6 ha)] that our analysis did not analyze. Other differences likely due to differences in analysis methods.</p>	
Tributary No. 5	794	321	776	314	794	322	151	61	174	71	147	60	19.00	22.47	18.53		
Tributary No. 6, Bull Creek Tributary 6 (2)	1,190	482	1,221	494	1,190	481	238	96	308	125	296	120	20.04	25.26	24.92		
Tributary 6 @ Sewage Line	1,178	477			1,178	477	238	96			296	120	20.22		25.11		
Tributary 7			1,795	726					215	87				11.95			
Troll Spring	129	52			129	52	63	25			65	26	48.29		50.68		
Tubb Spring	9	4			9	4	3	1			3	1	28.55		34.29		
TWASA Cave																	
Two Hole Cave																	
Upper Ribelin	284	115	261	106	284	115	43	18	76	31	44	18	15.34	29.14	15.53		
Wheless 2	283	115														This is a recently added site that COA did not analyze	

Springshed	Area Analyzed						Area Impervious						Percent Impervious			FWS vs. SWCA Notes	FWS vs. COA Notes
	FWS		SWCA		COA		FWS		SWCA		COA		FWS	SWCA	COA		
	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	Acres	Hectares	
Wheless Springs	411	166	142	57	412	167	0	0	5	2	1	0	0.00	3.21	0.18	The differences in watershed due to the fact that our point is about 1,000 ft (305 m) downstream of theirs. The difference in impervious cover acres is likely due to differences in analysis methods.	
Whitewater Cave																	
Salado Salamander																	
Big Boiling Spring, Lil' Bubbly Spring	86,681	35,079	88,143	35,670			354	143	3,596	1,455			0.41	4.08		Their watershed added a portion of Stillman Creek drainage that runs into Lampassas River (different drainage). Their impervious cover layer picks several large areas of what looks like open ground with no vegetation.	
Cistern Spring	4,480	1,813					2	1					0.04				
Happy Days Fish Farm (Critchfield Spring)	172	69					11	4					6.42				
Hog Hollow Spring	89	36					0	0					0.00				
Robertson Spring	86,500	35,005					327	132					0.38				
Solana Spring	67	27					0	0					0.01				