Effect of Conservation Measures

We multiplied 20% (the inverse of crossing effectiveness) by the total estimated panther/vehicle collisions in the 8 road segments with the highest annual rate of panther/vehicle collisions (Table 12), without a crossing already being constructed, to simulate effect of 8 crossings facilitated by the Applicants on future panther/vehicle collisions. The results of this simulation are reported in Table 13 of this appendix.

The following steps were used to determine the reduced number of mortalities expected in the Action Area due to HCP-generated traffic once the crossings are considered:

(A) Current Panther Mortality on High Mortality Road Segments

We looked at the current road segments and included any road segments that had panther road mortality from 2014 through 2018. We selected the 8 segments with the highest panther mortality in the present to estimate the reduction in mortality from HCP-generated traffic increases if the 8 wildlife crossing the Applicants' funding is expected to facilitate are constructed at either these locations or similarly high mortality road segments in the future. In other words, in the future we will look across the landscape and are likely to select the locations with the highest past and present mortalities. The high mortality road segments with associated panther mortality is found in Table 5-8. Combined, a total of 22 panther mortalities (~4.4/year) have occurred on these road segments and mortalities range from 2 (0.4/year) to 5 (1/year) on individual road segments.

(B) Current AADT on High Mortality Road Segment

These AADTs are found in Appendix A Table 10a in rows 1 and 3 through 9.

(C) Future AADT on High Mortality Road Segments from HCP-generated Traffic

The Future AADTs on High Mortality Road Segment from HCP-generated traffic was calculated using the Adjusted D1RPM Model and can be found in Appendix A. These segments are identified in the appendix by a Road Segment Identifier, constructed through the combination of two-way road segment traffic volumes listed under "A" and "B" in the FDOT D1RPM Model outputs. Only those segments with a history of panther mortality were used for calculating future mortality because the equation for calculating future mortality includes a measure of current mortality. We assumed road segments with existing mortality contained all of the features that would contribute to future mortality, such as the presence of habitat and panthers adjacent to areas of current panther-vehicle collision.

(D) Future HCP mortality on High Mortality Road Segments

We estimate the predicted proportion of future panther mortality due to HCP-generated traffic on each road segment with a history of high panther mortality using the following formula:

Future HCP mortality on High Mortality Road Segments = (Current Panther Mortality on High Mortality Road Segments / Current AADT on High Mortality Road Segment) x Future AADT on High Mortality Road Segment from HCP-generated Traffic.

Future mortality on high mortality Road Segments ranges from 0.4 to 2.6, and can be found in Appendix A. These segments are identified in the appendix by a Road Segment Identifier, constructed through the combination of two-way road segment traffic volumes listed under "A" and "B" in the FDOT D1RPM Model outputs.

(E) Future HCP Mortality Reduction on High Mortality Road Segments

To estimate the amount of mortality that is predicted to be reduced along each high mortality road segment when the conservation measure is implemented we assumed 1 crossing with fencing in each location would reduce mortality by 80 percent (See section 5.2.2.4 for method used to determine 80 percent reduction per crossing) at that location. The following equation was used to determine the reduction at each high mortality road segment:

HCP Mortality Reduction on High Mortality Road Segment = Future HCP Mortality on High Mortality Road Segments x 0.80

The reduction per high mortality road segment is listed in Table 12 in Appendix A.

(F) Future HCP Mortality Reduction due to HCP Conservation Measure

To estimate the total reduction in mortality after the conservation measure is considered we totaled the reduction in mortality at each high mortality road segment. The total reduction in panther mortality expected due to implementation of the 8 wildlife crossings is 3 fewer mortalities per year (above present) in the Action Area (Table 5-9).

Finally, to account for the possibility that crossing effectiveness could be increased in the future, we simulated conditions where mortality at the 8 highest mortality 'hot spots' were reduced by 100 percent within ¼ mile for the purpose of comparison. This simulation found that 8 wildlife crossings with 100 percent effectiveness reduced projected mortality by 4 panthers/year at full build out. The reduction in mortality from increasing effectiveness from 80 percent to 100 percent would result in 1 fewer mortality (above present) in the Action Area.

(G) Future Reduced HCP Mortality in the Action Area

To estimate total predicted proportion of future panther mortality due to HCP-generated traffic after implementation of the minimization measure, we used the following formula:

Future Reduced HCP Mortality in the Action Area = Future HCP Mortality in the Action Area – Future HCP Mortality Reduction due to HCP Conservation Measure

Table 1 PVM Adjusted for the Installation of 8 New Wildlife Crossings Proposed by the Applicants

Road Segment Identifier	2070 Non-HCP PVM	2070 HCP PVM	2070 Total PVM	2070 Non-HCP PVM w/ 8 Crossings	2070 HCP PVM w/8 Crossings	2070 Total PVM w/ 8 Crossings
11416_11415	2.058	0.006	**2.713**	0.412	0.001	**0.413**
27167_27202	0.514	0.186	**2.643**	0.103	0.037	**0.140**
27369_24041	0.036	0.626	**2.641**	0.007	0.125	**0.132**
27457_27458	0.042	0.002	**2.241**	0.008	0.000	**0.009**
26919_26934	0.019	0.474	**1.442**	0.004	0.095	**0.099**
27414_24845	0.025	0.655	**1.145**	0.005	0.131	**0.136**
24039_27446	0.019	2.198	**1.012**	0.004	0.440	**0.443**
27360_27362	0.007	0.001	**0.903**	0.001	0.000	**0.002**
25001_25027	0.857	0.071	**0.895**	0.171	0.014	**0.186**
24206_24208	0.052	0.535	**0.879**	0.052	0.535	**0.587**
27362_27363	0.007	0.896	**0.874**	0.007	0.896	**0.903**
27213_27221	0.100	2.129	**0.860**	0.100	2.129	**2.230**
26539_26638	0.309	0.177	**0.852**	0.309	0.177	**0.486**
24627_24810	0.612	0.005	**0.685**	0.612	0.005	**0.618**
27156_27180	0.339	0.108	**0.664**	0.339	0.108	**0.448**
11506_11826	0.566	1.120	**0.662**	0.566	1.120	**1.687**
24054_27453	0.007	0.112	**0.643**	0.007	0.112	**0.120**
27453_24047	0.007	0.636	**0.643**	0.007	0.636	**0.643**
24068_27441	0.007	0.635	**0.633**	0.007	0.635	**0.643**
26493_26539	0.214	0.004	**0.568**	0.214	0.004	**0.218**
24030_24035	0.004	0.435	**0.540**	0.004	0.435	**0.440**
26952_27018	0.309	0.045	**0.494**	0.309	0.045	**0.354**
26934_26919	0.006	0.050	**0.481**	0.006	0.050	**0.057**
27168_27163	0.004	0.033	**0.480**	0.004	0.033	**0.036**
24833_24830	0.030	0.068	**0.445**	0.030	0.068	**0.099**
27231_27233	0.003	0.476	**0.439**	0.003	0.476	**0.479**
26750_26770	0.174	0.325	**0.430**	0.174	0.325	**0.499**
27213_27202	0.050	0.342	**0.410**	0.050	0.068	**0.118**
24811_27270	0.045	0.760	**0.389**	0.045	0.760	**0.804**
27270_27271	0.045	0.344	**0.387**	0.045	0.344	**0.389**
26265_26252	0.322	0.001	**0.366**	0.322	0.001	**0.323**
26662_26668	0.127	0.030	**0.307**	0.127	0.030	**0.157**
26493_24000	0.107	0.354	**0.284**	0.107	0.354	**0.461**
27452_27655	0.017	0.260	**0.280**	0.017	0.260	**0.277**
27087_27018	0.173	0.055	**0.280**	0.173	0.055	**0.228**
27439_27440	0.018	0.207	**0.278**	0.018	0.207	**0.226**
11420_11421	0.195	0.196	**0.263**	0.195	0.196	**0.392**
11512_11418	0.188	0.068	**0.256**	0.188	0.068	**0.256**
27485_27492	0.015	0.090	**0.249**	0.015	0.090	**0.105**
11828_11827	0.208	0.073	**0.238**	0.208	0.048	**0.256**
11467_27489	0.038	0.103	**0.234**	0.038	0.103	**0.140**

24833_27477	0.015	0.415	**0.222**	0.015	0.415	**0.430**
27429_27422	0.012	0.263	**0.222**	0.012	0.263	**0.276**
27180_27156	0.113	0.361	**0.221**	0.113	0.361	**0.474**
25888_25800	0.208	0.012	**0.220**	0.208	0.012	**0.220**
25920_25922	0.208	0.012	**0.220**	0.208	0.012	**0.220**
25924_25922	0.208	0.012	**0.220**	0.208	0.012	**0.220**
25927_25931	0.208		**0.220**	0.208	0.000	**0.208**
27185_27200	0.051	0.167	**0.219**	0.051	0.167	**0.219**
27202_27200	0.051	0.004	**0.219**	0.051	0.004	**0.055**
27549_27263	0.144	0.158	**0.212**	0.144	0.158	**0.301**
27153_24825	0.051	0.050	**0.208**	0.051	0.050	**0.100**
11468_11800	0.034	0.068	**0.194**	0.034	0.068	**0.102**
10435_10336	0.186	0.828	**0.193**	0.186	0.828	**1.014**
23802_27057	0.075	0.001	**0.187**	0.075	0.001	**0.077**
27536_27549	0.127	0.167	**0.183**	0.127	0.167	**0.294**
25883_25885	0.168	0.543	**0.177**	0.168	0.543	**0.711**
11440_11508	0.073	0.076	**0.176**	0.073	0.076	**0.150**
11534_11553	0.038	0.137	**0.175**	0.038	0.137	**0.175**
11648_11469	0.038	0.160	**0.175**	0.038	0.160	**0.197**
26666_26771	0.116	0.867	**0.171**	0.116	0.867	**0.983**
24433_24481	0.166	0.012	**0.171**	0.166	0.012	**0.178**
27482_27499	0.105	0.056	**0.155**	0.105	0.056	**0.161**
26294_24018	0.121	0.107	**0.148**	0.121	0.107	**0.227**
23952_26666	0.102	0.028	**0.147**	0.102	0.028	**0.130**
26605_26464	0.057	0.036	**0.128**	0.057	0.036	**0.092**
11440_11473	0.023	0.090	**0.113**	0.023	0.090	**0.113**
11473_11440	0.023	0.090	**0.113**	0.023	0.090	**0.113**
11531_11473	0.023	0.137	**0.113**	0.023	0.137	**0.160**
26155_26078	0.077	0.256	**0.090**	0.077	0.256	**0.333**
24216_24219	0.010	0.210	**0.086**	0.010	0.210	**0.220**
27461_27500	0.031	0.050	**0.082**	0.031	0.050	**0.082**
27564_27566	0.031	2.605	**0.082**	0.031	2.605	**2.636**
27107_26867	0.028	0.036	**0.064**	0.028	0.036	**0.064**
27162_27107	0.028	0.036	**0.064**	0.028	0.036	**0.064**
27218_27204	0.028	1.423	**0.064**	0.028	1.423	**1.451**
26859_27111	0.028	0.038	**0.061**	0.028	0.038	**0.067**
11928_12538	0.052	0.993	**0.053**	0.052	0.993	**1.045**
11892_11955	0.044	0.096	**0.048**	0.044	0.096	**0.140**
11953_11954	0.039	0.004	**0.043**	0.039	0.004	**0.043**
24320_24337	0.039	0.179	**0.042**	0.039	0.179	**0.219**
11658_11514	0.005	0.234	**0.041**	0.005	0.234	**0.239**
25955_26075	0.035	0.013	**0.040**	0.035	0.013	**0.048**
25069_25051	0.031	0.009	**0.034**	0.031	0.009	**0.040**
24534_24541	0.031	0.001	**0.032**	0.031	0.001	**0.032**
24541_24547	0.031	0.002	**0.032**	0.031	0.002	**0.033**

24559_24553	0.030	0.001	**0.031**	0.030	0.001	**0.031**
23492_23581	0.029	0.000	**0.030**	0.029	0.000	**0.030**
23893_24095	0.029	0.000	**0.029**	0.029	0.000	**0.029**
24060_23982	0.029	0.044	**0.029**	0.029	0.044	**0.073**
24847_27489		0.037		0.000	0.037	**0.037**
TOTAL	11	26	**37**	8	22	**31**
Above Present	5	11	**16**	2	8	**10**

Table 2a and 13b. The effects of additional wildlife crossings and internal trip capture on panther mortality above present. All values indicate annual mortality at full build-out of HCP proposed developments. Negative values indicate a reduction in mortality from a non-HCP source or from current mortality. Bold and orange cell shading indicates the range expected with currently proposed HCP conservation measures applied. For the purpose of the PVA all values were rounded up to the nearest whole number

		Internal Trip Capture								
		HCP (a)								
		80%	**70%**	**60%**	**50%**	**40%**	**30%**	**20%**	**10%**	**0%**
	0	4.28	6.41	8.55	10.69	12.83	14.97	17.10	23.09	21.38
	5	3.86	5.79	7.72	9.65	11.58	13.51	15.44	20.85	19.30
	8	2.95	4.42	5.89	**7.37**	8.84	10.32	11.79	15.91	14.74
	10	2.75	4.13	5.51	**6.88**	8.26	9.64	11.01	14.87	13.77
	12	1.78	2.68	3.57	**4.46**	5.35	6.25	7.14	9.64	8.92
	15	1.69	2.54	3.38	4.23	5.08	5.92	6.77	9.14	8.46
Additional Wildlife Crossings	**20**	0.89	1.33	1.78	2.22	2.67	3.11	3.56	4.80	4.45
	25	0.69	1.03	1.37	1.72	2.06	2.41	2.75	3.71	3.44
	30	-0.03	-0.05	-0.06	-0.08	-0.10	-0.11	-0.13	-0.17	-0.16
		HCP + Cumulative Effects (b)								
	0	8.92	11.05	13.19	15.33	21.74	22.81	23.88	24.95	26.02
	5	6.36	8.29	10.22	12.15	17.94	18.91	19.88	20.84	21.81
	8	5.41	6.88	8.36	**9.83**	14.25	14.99	15.73	16.46	17.20
	10	4.49	5.87	7.24	**8.62**	12.75	13.44	14.13	14.81	15.50
	12	3.43	4.33	5.22	**6.11**	8.79	9.24	9.68	10.13	10.57
	15	2.33	3.18	4.03	4.87	7.41	7.83	8.25	8.68	9.10
	20	0.93	1.37	1.82	2.26	3.60	3.82	4.04	4.26	4.48
	25	0.40	0.75	1.09	1.44	2.47	2.64	2.81	2.98	3.15
	30	-0.57	-0.58	-0.60	-0.62	-0.66	-0.67	-0.68	-0.69	-0.70

Table 13c. Relationship between acres developed, human population size, daily trips, and panther/vehicle mortality on 91 road segments with existing records of panther/vehicle mortality. This table assumes 50 percent internal capture. For the purpose of the PVA all numbers were rounded to the nearest whole number.

Percent Developed	Acres Developed	Residents Above Present	Dwellings Above Present	Daily Trips From/To HCP Footprint	Daily Trips From/To Non-HCP Areas	2070 Total Daily Trips	HCP Annual PVM Rate Above Present	Non-HCP Annual PVM Rate Above Present	Total Annual PVM Rate Above Present	*Total Annual PVM Rate Above Present	Mortality from other sources	Total Morality
0%	0	0	0	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00
10%	3,997	17,400	9,148	71,799	62,727	134,525	1.07	0.46	1.53	0.98	0.40	1.38
20%	7,995	34,800	18,296	143,597	125,453	269,051	2.14	0.93	3.06	1.97	0.80	2.77
30%	11,992	52,200	27,444	215,396	188,180	403,576	3.20	1.39	4.60	2.95	1.20	4.15
40%	15,989	69,600	36,592	287,195	250,907	538,101	4.27	1.86	6.13	3.93	1.60	5.53
50%	19,987	87,000	45,740	358,994	313,633	672,627	5.34	2.32	7.66	4.92	2.00	6.92
60%	23,984	104,400	54,888	430,792	376,360	807,152	6.41	2.78	9.19	5.90	2.40	8.30
70%	27,981	121,800	64,036	502,591	439,087	941,677	7.48	3.25	10.72	6.88	2.80	9.68
80%	31,978	139,200	73,184	574,390	501,813	1,076,203	8.54	3.71	12.26	7.86	3.20	11.06
90%	35,976	156,600	82,332	646,188	564,540	1,210,728	9.61	4.18	13.79	8.85	3.60	12.45
100%	39,973	174,000	91,480	717,987	627,266	1,345,254	10.68	4.64	15.32	9.83	4.00	13.83

**with 8 additional wildlife crossings*