

Appendix H

BO section 5.3.1.4 Motor Vehicle Mortality and Mortality Associated with Effects of the Action

Motor Vehicle Mortality

We used the FDOT District 1 Regional Planning Model (D1RPM) to predict traffic levels in the Action Area for the year 2040 and 2070, based on socioeconomic projections (residents/jobs) for southwest Florida. We adjusted the regional socioeconomic projections to account for the addition of residents and jobs at a density comparable to that in the Ave Maria development on 39,973 acres of the Plan Area.

The full geospatial data representation of the D1RPM road segment volume predictions, including a table of the road segment attributes, can be downloaded from the following internet location in the Service's public-facing administrative record repository: <https://ecos.fws.gov/ServCat/Reference/Profile/111968>. This geospatial data can be viewed in Esri ArcMap-compatible applications. The FDOT 2040 D1RPM road segments are also viewable on computers and smart phones, via Esri's Arc GIS Online web mapping service, at the following internet location: <https://fws.maps.arcgis.com/apps/webappviewer/index.html?id=66e4a31663c54ca9b9f6591f4b8b8683>.

Motor Vehicle Mortality Associated with Effects of the Action

We found HCP-proposed developments will likely generate a portion of the total traffic volume in the future. Using the D1RPM and the adjustments describe above (Adjusted D1RPM Model), we estimate the proposed development in the HCP will generate 718,498 new daily trips on regional roadways that either originate in or terminate within areas proposed for development in the HCP. The range of contribution from the HCP on individual road segments in the model is between a 0 percent and 98.5 percent increase over current AADT.

To analyze the increased risk of this portion of traffic to panthers we do the following:

(1) Current Road Segment Mortality:

Our analysis of panther/vehicle collisions and traffic volume generated from past projects in the Action Area found increasing traffic volume increases impacts to the panther. However, our analysis and literature review also indicate many additional factors aside from traffic volume also influence the probability of panther/vehicle collisions. These include, but are not limited to, the abundance of panthers in proximity to roadways, the availability of suitable panther habitat near roadways, the presence of wildlife crossings, traffic speed, and road width (Schwab and Zandbergen, 2011). We posit the recent history of panther mortalities on a particular road segment is the best available means of integrating the combined influence of all such factors operating along a given roadway. Thus, we predict future annual mortality rates for each road segment in the Action Area will increase as a linear function of traffic volume consistent to that observed by Charry and Jones (2009). We have subsequently confirmed this to be the general pattern of effects with our own analysis of the record of panther vehicle mortality increases in response to increased traffic from past developments in the Action Area, such as those that occurred following the construction of developments like Ave Maria.

Vehicles struck 110 panthers on 91 road segments in the Action Area from 2014 through 2018, with 40 percent of all mortalities being females. The 5-year mortality rate on individual road segments varied between 0 and 5 individuals/5 years; with at least one mortality occurring on the

segment between 2014 and 2018. The average annual mortality for a road segment was calculated by counting the number of mortalities on a road segment from 2014 through 2018, then dividing that number by 5 (the number of years from 2014 through 2018). Annual mortality for individual road segments is provided in Appendix A.

(2) Current Road Segment AADT in Action Area:

The current road segment AADTs in the Action Area are an average of AADTs on each road segment from 2014 through 2018, and can be found in Appendix A. The current average AADTs for segments within the FDOT District 1 road network range from 0 to 133,700. Only those segments with a history of panther mortality, and a current road segment AADT data were used for calculating future mortality. These segments are identified in the appendix in the first column of Table 10a as “Road Segment Identifier” (segment), which we generated locally by combining the D1RPM bi-directional “A” and “B” segment identification numbers. The AB Segment number is identified in the first column of Table 5-7 as the “Road Segment Identifier”. The current AADT data for each segment was derived from two sources: FDOT’s Transportation Data and Analytics Office GIS data (2019), and Collier County’s Transportation Data Management System (2019).

(3) Future Road Segment HCP AADT in Action Area:

The Future Road Segment HCP AADTs in the Action Area are found in the Adjusted D1RPM Model and can be found in Appendix A. The segments with a history of panther mortality are identified in the appendix table by the D1RPM “Road Segment Identifier” number for the road segment closest to each documented panther mortality. 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. The D1RPM model predicts future segment AADTs, for the year 2040, for all road segments within FDOT District 1 (Figure 5-8, and Table 10a in Appendix A). The full geospatial data representation of the FDOT 2040 D1RPM road segment volume predictions, including a table of the road segment attributes, can be downloaded from the following internet location in the Service’s public-facing administrative record repository: <https://ecos.fws.gov/ServCat/Reference/Profile/111968>. This geospatial data can be viewed in Esri ArcMap-compatible applications. The FDOT 2040 D1RPM road segments are also viewable on computers and smart phones, via Esri’s Arc GIS Online web mapping service, at the following internet location: <https://fws.maps.arcgis.com/apps/webappviewer/index.html?id=66e4a31663c54ca9b9f6591f4b8b8683>. Individual road segments in the geospatial D1RPM model data table are listed under column “AB” (geospatial D1RPM model data is available for download from the USFWS ServCat/ArcGIS Online (AGOL)/DataShare/by telephone or email request). The amount of the future AADT attributable to HCP is defined in the D1RPM model as proportion of traffic volume that either originates in or terminates within areas proposed for development in the HCP. The proportion of HCP-attributable traffic volume is identified in the geospatial D1RPM data table as “HCP_PCT_T”.

The method assumes that average annual mortality and average annual AADT over the last 5 years represent a roadway segment’s current (baseline) traffic and mortality risk. This estimation method also assumes that changes in mortality are directly related to traffic volume. This method does not consider other important factors that contribute to mortality risk such as number of panthers accessing roadways, traffic speed, differences in traffic volume throughout the day, wildlife fencing, underpasses, surrounding habitat/land use and panther use of that habitat, etc. 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.

(4) Future Road Segment HCP Mortality in Action Area:

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

Future Road Segment HCP Mortality in Action Area = (Current Road Segment Mortality / Current Road Segment AADT in Action Area) x Future Road Segment HCP AADT in Action Area.

Future Road Segment HCP Mortality in the Action Area ranges from ~0.00004 individuals/year to 2.6 individuals/year, and can be found in Appendix A. These segments are identified in the appendix by “Road Segment Identifier” in Appendix tables, or “AB” in the geospatial data set. The road segment identifier is the concatenated key used in the FDOT traffic model that serves as the bi-directional road segment identifier.

(5) Future HCP Mortality in the Action Area:

To estimate the total predicted proportion of future panther mortality due to HCP-generated traffic, all of the predicted proportion of future panther mortality due to HCP-generated traffic on each road segment (step 4) were totaled.

91 segments with a history of panther/vehicle collisions in the Action Area (roadways with an HCP contribution of 100+ vehicle trips/day) were identified by selecting the segment closest a documented panther/vehicle collision with the use of the ArcGIS spatial join selection tool (Table 9). This selection process assumed that the panthers were struck by vehicles on the road segment closest to where they were found. On these road segments 110 panthers were killed or injured by vehicle collision during a five span of time from 2014 thru 2018. Average annual mortality of panthers on all segments was 22 individuals/year. Annual mortality on individual road segments ranged between 0.2 individuals/year to 1 individual/year. The sum of Annual Average Daily Traffic (AADT) on these road segments from 2014 thru 2018 was 1,714,355 trips per day.

2040 projected AADT for the road segments in the Action Area with a history of panther mortality is 2,420,379 trips/day. Of these 717,987 trips originate in, or will terminate in, transportation analysis zones (TAZs) within the HCP footprint. Our model assumed full build-out, so we consider this to be the full volume of traffic originating or terminating in HCP developments annually after full build out. In 2040 1,679,318 trips/day will originate or terminate in TAZs not associated with the HCP.

To estimate the influence of traffic from non-HCP sources we extrapolated the traffic growth trend for non-HCP traffic volumes to 2070. Specifically, we subtracted the 2014 thru 2018 AADT from the 2040 Non-HCP AADT, divided this by the intervening time interval (22 years), then multiplied the result by 52 to approximate the change in traffic that would occur from non-HCP sources between 2018 and 2070. Our analysis found that non-HCP contributions to traffic in the HCP Action Area would decline over time, and that the decline in non-HCP traffic would ultimately shift the total traffic contribution from its peak of 2,420,379 trips/day in 2040 by 803,923 to a total of 1,521,909 trips/day in 2070. Meanwhile, because of the development cap

implemented by the Applicants the contribution of HCP-generated traffic would remain constant at 717,987 trips/day throughout.

Further review of the model and our assumptions found that most traffic volume (74.7 percent) generated from non-HCP sources between now, 2040, and 2070 would likely constitute future federal actions the Service would consult on through Section 7 of the Endangered Species Act. Thus, we recognized we can not assume the full body of estimated non-HCP traffic will be realized without additional avoidance, minimization, and mitigation measures being implemented to offset non-HCP traffic impacts to panthers. Because of this we adjusted our estimate of panther/vehicle mortality to reflect only the 25.3 percent of 2070 estimated panthers that would be impacted by vehicles originating or entering future non-HCP developments that will likely occur without consultation with the Service.

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 (Figure 1). We assumed road segments with existing mortality contained all the features that would contribute to future mortality, such as the presence of habitat and panthers adjacent to areas of current panther-vehicle collision. We estimated future mortality by treating it as a linear function of traffic volume:

$$\text{Future Mortality} = \text{Current Mortality} \times (\text{Future AADT} / \text{Current AADT})$$

Our summary of the estimate of future panther/vehicle collisions attributable to source by segment and total is represented in Table 9 of this appendix.

Figure 1. Road Segments with panther/vehicle mortalities (PVM) in the past 5 years. Only those segments likely to be impacted by 100 or more trips/day originating in, or terminating in, the HCP footprint were analyzed further.

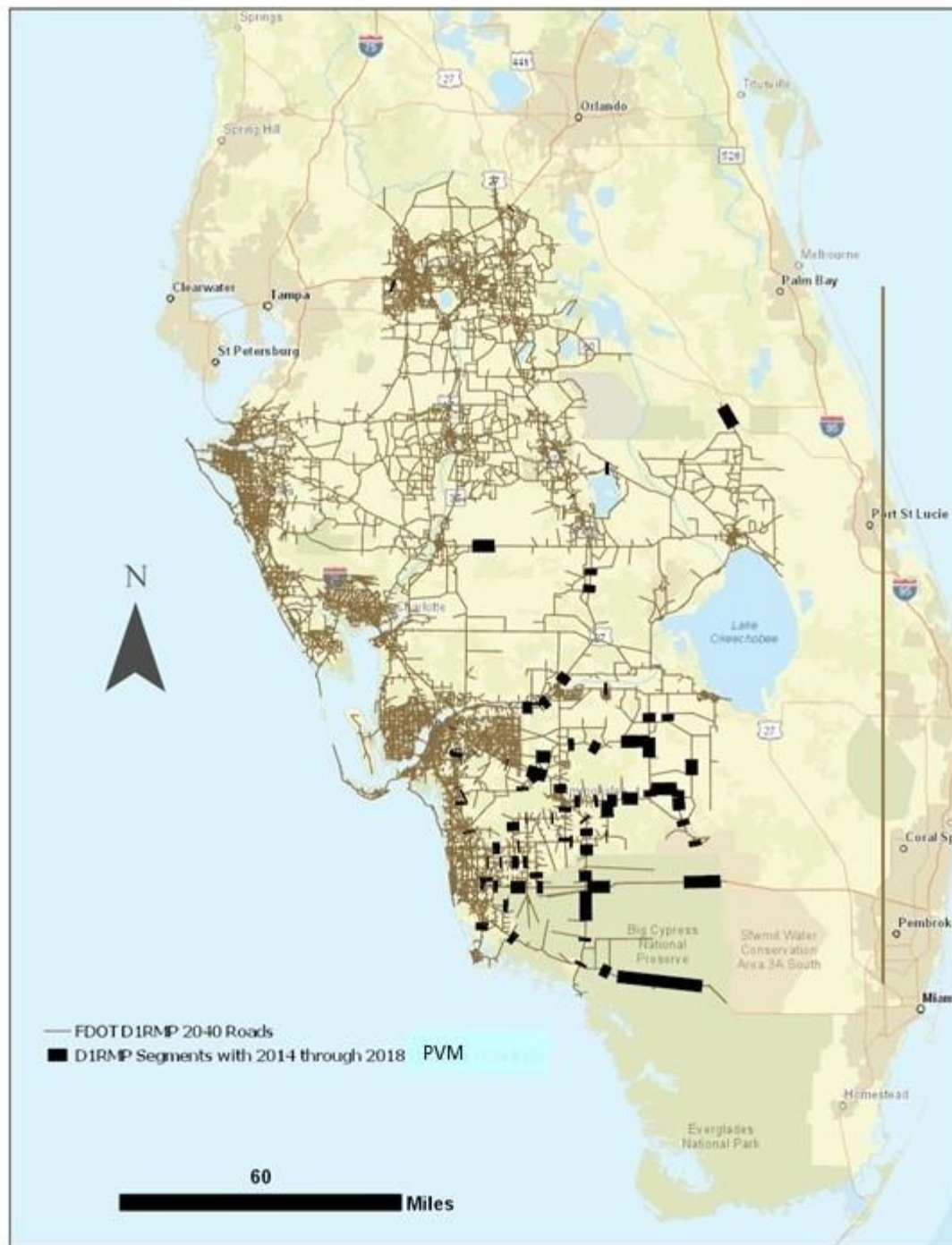


Table 10a Annual Average Daily Traffic (AADT) and Panther/Vehicle Mortality (PVM) by year and road segment. Road segments shaded in grey indicate a crossing is already under construction at that site. Segments in peach indicate road segments

which will exceed 10,000+ vehicle trips/day because of traffic generated by development proposed in the HCP. The first 9 segments where a wildlife crossing is not already under construction were used to simulate the establishment of wildlife crossings for the purpose of analyzing the effect of 8 additional wildlife crossings being facilitated by the Applicants.

Road Segment Identifier	2014-2018 AADT	2014-2018 Total PVM	2014-2018 Annual PVM	Portion of total traffic attributable to HCP	2070 HCP AADT	2070 Non-HCP AADT ¹	2070 Total AADT	2070 HCP PVM	2070 Non-HCP PVM	Total 2070 PVM
11416_11415	490	1	0.2	0.1559	1,604	5,042	6,646	0.65	2.058	2.713
27167_27202	11,860	5	1	0.6694	25,253	6,097	31,350	2.13	0.514	2.643
27369_24041	1,475	1	0.2	0.9762	19,210	268	19,477	2.60	0.036	2.641
27457_27458	3,814	2	0.4	0.9653	20,962	405	21,367	2.20	0.042	2.241
26919_26934	7,493	3	0.6	0.9719	17,772	234	18,006	1.42	0.019	1.442
27414_24845	1,762	1	0.2	0.9603	9,868	220	10,088	1.12	0.025	1.145
24039_27446	4,220	1	0.2	0.9652	20,953	401	21,354	0.99	0.019	1.012
27360_27362	10,842	1	0.2	0.9852	48,593	381	48,974	0.90	0.007	0.903
25001_25027	2,197	1	0.2	0.0242	422	9,415	9,837	0.04	0.857	0.895
24206_24208	2,490	1	0.2	0.8934	10,305	642	10,947	0.83	0.052	0.879
27362_27363	10,842	1	0.2	0.9847	47,010	379	47,389	0.87	0.007	0.874
27213_27221	15,130	2	0.4	0.7753	28,729	3,801	32,530	0.76	0.100	0.860
26539_26638	33,672	3	0.6	0.4318	30,481	17,356	47,837	0.54	0.309	0.852
24627_24810	4,600	1	0.2	0.0606	1,683	14,080	15,763	0.07	0.612	0.685
27156_27180	18,640	3	0.6	0.2846	10,087	10,547	20,634	0.32	0.339	0.664
11506_11826	1,270	1	0.2	0.0835	610	3,596	4,206	0.10	0.566	0.662
24054_27453	6,220	1	0.2	0.9769	19,768	230	19,998	0.64	0.007	0.643
27453_24047	6,220	1	0.2	0.9768	19,759	230	19,989	0.64	0.007	0.643
24068_27441	6,220	1	0.2	0.9765	19,458	229	19,687	0.63	0.007	0.633
26493_26539	33,672	2	0.4	0.4181	29,781	18,000	47,781	0.35	0.214	0.568
24030_24035	5,400	1	0.2	0.9833	14,455	115	14,570	0.54	0.004	0.540
26952_27018	18,640	2	0.4	0.2097	8,646	14,384	23,030	0.19	0.309	0.494
26934_26919	7,493	1	0.2	0.9719	17,772	234	18,006	0.47	0.006	0.481
27168_27163	6,785	1	0.2	0.9841	16,153	119	16,272	0.48	0.004	0.480
24833_24830	1,762	2	0.4	0.8167	1,828	134	1,962	0.42	0.030	0.445
27231_27233	7,209	1	0.2	0.9836	15,696	115	15,811	0.44	0.003	0.439
26750_26770	10,840	1	0.2	0.4160	13,878	9,453	23,331	0.26	0.174	0.430
27213_27202	15,130	1	0.2	0.7661	27,279	3,754	31,033	0.36	0.050	0.410
24811_27270	16,450	1	0.2	0.7736	28,332	3,667	31,998	0.34	0.045	0.389
27270_27271	16,450	1	0.2	0.7724	28,151	3,662	31,813	0.34	0.045	0.387
26265_26252	27,000	2	0.4	0.0549	2,971	21,737	24,708	0.04	0.322	0.366
26662_26668	10,840	1	0.2	0.3871	9,724	6,902	16,627	0.18	0.127	0.307
26493_24000	33,672	1	0.2	0.4181	29,781	18,000	47,781	0.18	0.107	0.284
27452_27655	1,420	1	0.2	0.8538	1,869	120	1,989	0.26	0.017	0.280
27087_27018	18,640	1	0.2	0.2190	9,943	16,163	26,106	0.11	0.173	0.280

27439_27440	1,420	1	0.2	0.8418	1,846	130	1,975	0.26	0.018	0.278
11420_11421	570	1	0.2	0.1372	193	556	749	0.07	0.195	0.263
11512_11418	570	1	0.2	0.1405	193	537	730	0.07	0.188	0.256
27485_27492	430	1	0.2	0.8454	503	32	535	0.23	0.015	0.249
11828_11827	10,480	1	0.2	0.0610	1,557	10,911	12,467	0.03	0.208	0.238
11467_27489	980	1	0.2	0.6570	962	184	1,146	0.20	0.038	0.234
24833_27477	1,762	1	0.2	0.8176	1,826	133	1,959	0.21	0.015	0.222
27429_27422	1,760	1	0.2	0.8443	1,846	109	1,954	0.21	0.012	0.222
27180_27156	18,640	1	0.2	0.2846	10,087	10,547	20,634	0.11	0.113	0.221
25888_25800	33,400	1	0.2	0.0248	1,956	34,760	36,716	0.01	0.208	0.220
25920_25922	33,400	1	0.2	0.0248	1,956	34,760	36,716	0.01	0.208	0.220
25924_25922	33,400	1	0.2	0.0248	1,956	34,760	36,716	0.01	0.208	0.220
25927_25931	33,400	1	0.2	0.0248	1,956	34,760	36,716	0.01	0.208	0.220
27185_27200	3,440	1	0.2	0.5468	2,875	886	3,761	0.17	0.051	0.219
27202_27200	3,440	1	0.2	0.5468	2,875	886	3,761	0.17	0.051	0.219
27549_27263	2,340	1	0.2	0.1692	801	1,680	2,482	0.07	0.144	0.212
27153_24825	3,380	1	0.2	0.5322	2,666	854	3,521	0.16	0.051	0.208
11468_11800	980	1	0.2	0.6093	782	167	949	0.16	0.034	0.194
10435_10336	4,780	1	0.2	0.0143	147	4,455	4,603	0.01	0.186	0.193
23802_27057	13,073	1	0.2	0.3605	7,350	4,905	12,255	0.11	0.075	0.187
27536_27549	2,871	1	0.2	0.1529	803	1,820	2,623	0.06	0.127	0.183
25883_25885	33,400	1	0.2	0.0221	1,492	28,105	29,597	0.01	0.168	0.177
11440_11508	1,270	1	0.2	0.3402	652	467	1,119	0.10	0.073	0.176
11534_11553	980	1	0.2	0.5411	672	185	857	0.14	0.038	0.175
11648_11469	980	1	0.2	0.5411	672	185	857	0.14	0.038	0.175
26666_26771	26,500	1	0.2	0.1578	7,246	15,399	22,645	0.05	0.116	0.171
24433_24481	39,142	1	0.2	0.0108	839	32,571	33,410	0.00	0.166	0.171
27482_27499	3,240	1	0.2	0.1531	803	1,708	2,512	0.05	0.105	0.155
26294_24018	26,500	1	0.2	0.0827	3,679	15,980	19,659	0.03	0.121	0.148
23952_26666	26,500	1	0.2	0.1430	5,955	13,491	19,446	0.04	0.102	0.147
26605_26464	23,796	2	0.4	0.2400	4,230	3,383	7,614	0.07	0.057	0.128
11440_11473	1,270	1	0.2	0.4996	570	144	715	0.09	0.023	0.113
11473_11440	1,270	1	0.2	0.4996	570	144	715	0.09	0.023	0.113
11531_11473	1,270	1	0.2	0.4996	570	144	715	0.09	0.023	0.113
26155_26078	40,300	2	0.4	0.0417	1,335	7,748	9,083	0.01	0.077	0.090
24216_24219	3,731	1	0.2	0.6600	1,420	185	1,604	0.08	0.010	0.086
27461_27500	21,760	1	0.2	0.2892	5,471	3,396	8,867	0.05	0.031	0.082
27564_27566	21,760	1	0.2	0.2892	5,471	3,396	8,867	0.05	0.031	0.082
27107_26867	23,796	1	0.2	0.2400	4,230	3,383	7,614	0.04	0.028	0.064
27162_27107	23,796	1	0.2	0.2400	4,230	3,383	7,614	0.04	0.028	0.064
27218_27204	23,796	1	0.2	0.2400	4,230	3,383	7,614	0.04	0.028	0.064

26859_27111	23,796	1	0.2	0.2255	3,899	3,383	7,282	0.03	0.028	0.061
11928_12538	21,125	1	0.2	0.0072	154	5,449	5,603	0.00	0.052	0.053
11892_11955	7,965	1	0.2	0.0216	154	1,756	1,910	0.00	0.044	0.048
11953_11954	7,965	1	0.2	0.0243	154	1,560	1,714	0.00	0.039	0.043
24320_24337	28,600	1	0.2	0.0154	348	5,616	5,964	0.00	0.039	0.042
11658_11514	1,270	1	0.2	0.6737	234	29	262	0.04	0.005	0.041
25955_26075	40,300	1	0.2	0.0385	1,105	6,969	8,074	0.01	0.035	0.040
25069_25051	97,300	1	0.2	0.0180	1,107	15,305	16,412	0.00	0.031	0.034
24534_24541	97,300	1	0.2	0.0098	584	14,904	15,488	0.00	0.031	0.032
24541_24547	97,300	1	0.2	0.0098	584	14,904	15,488	0.00	0.031	0.032
24559_24553	97,300	1	0.2	0.0103	600	14,594	15,194	0.00	0.030	0.031
23492_23581	86,100	1	0.2	0.0047	235	12,655	12,890	0.00	0.029	0.030
23893_24095	88,800	1	0.2	0.0033	164	12,681	12,845	0.00	0.029	0.029
24060_23982	88,800	1	0.2	0.0033	164	12,681	12,845	0.00	0.029	0.029
24847_27489		2	0.4	0.7218	241	55	297			
Totals	1,714,355	110	22		717,987	627,266	1,345,254	26	11	37

Table 10b. Future proposed crossings and status of planning

Underpass Name	Segment AB	Stage of Planning	Funding	SFESO: Reasonably Certain to Occur? (Yes or No)	Reasoning
ECPO proposed in HCP (X # of underpasses)		pre-planning	Committed to first \$12.5 from Marinelli fund		
SR 82 over Panther Creek FPID 430848-1	27213_27202	under construction	part of FPID 430848-1 which is currently funded for construction in FY 2023 (scheduled for a 7/21/2022 letting)	Yes	part of FPID 430848-1 which is currently funded for construction in FY 2023 (scheduled for a 7/21/2022 letting)
SR 82 under canal FPID 430848-1	27167_27202	under construction	part of FPID 430848-1 which is currently funded for construction in FY 2023 (scheduled for a 7/21/2022 letting)	Yes	part of FPID 430848-1 which is currently funded for construction in FY 2023 (scheduled for a 7/21/2022 letting)
SR 29 at Owl Hammack (417540-3)	24059_27450	At this time, this project isn't funded for ROW or Construction	None	No	At this time, this project isn't funded for ROW or Construction
SR 29 at Twelve Mile Slough (417878-5)	11384_11439	Under design. ROW in FY 2025 construction not in 5 year Work Program	None	No	construction not in 5 year Work Program
SR 29 at Sears and Roberts Canal (417878-7)	11387_11511	Under design, ROW in FY 2023, construction not in 5 year Work Program	None	No	construction not in 5 year Work Program
SR 80 east of Labelle	11376_11692	under construction	Funded	Yes	Under Construction
BRIDGE 030141 ON IMMOKALEE ROAD	24828_27489	pre-planning	?	?	pre-planning
BRIDGE 030158 ON COUNTY LINE ROAD	24847_27489	pre-planning	?	?	pre-planning
Corkscrew at Corkscrew Crossings	24965_25224	Designed and funded	Funded	?	Planned but won't be built until County has a fix on future road capacities.