Special Study Summary Report
Analysis of ADAS Forward Collision Warning (FCW)

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Introduction

This study is similar to the Lane Departure Warning study. In fact, it was found that all of the LDW standard equipment Toyota models also required Forward Collisions Warning (FCW). Finding a large enough alternative subset that had no FCW as standard equipment was not trivial, but fortunately, Ford put out a sufficient number of vehicles that just three of their models in years 2018 and 2019 could serve this purpose.

Other ADAS studies can be found here: **http://www.safehomealabama.gov/caps-special-studies/** under the "Vehicle-Related" category.

Technical Details

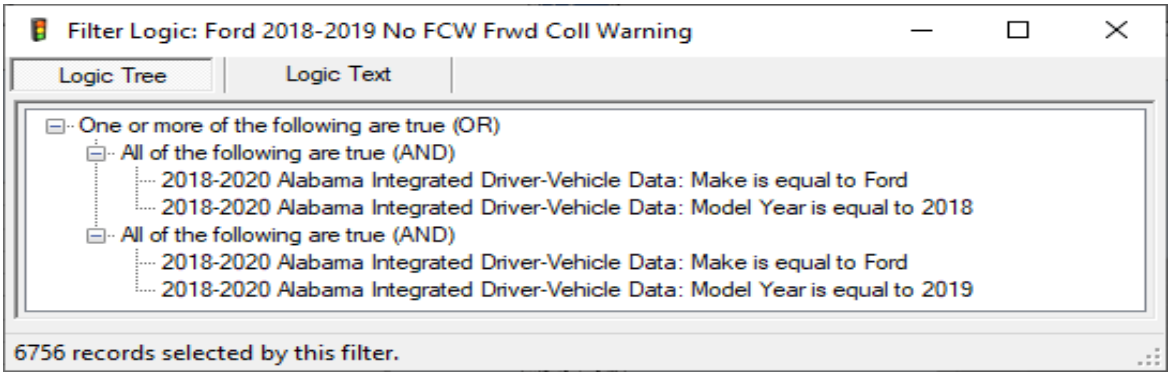
The filter used for the FCW standard is identical to that for the Lane Departure Warning (LDW) study, since both ADAS features were standard in these models. This filter (for the IMPACT "Other" column) is in the LDW folder of the 2018-2020 Alabama Integrated Driver-Vehicle Data, and its name is:

Toyota MY 2019-2021 Ln Dep Wrng LDW.

Ford Ecosport, Fiesta and Transit in model years 2018 and 2019 were used as the non-FCW comparison subset. This filter (for the IMPACT "Subset" column) is in the FCW folder of the 2018-2020 Alabama Integrated Driver-Vehicle Data, and its name is:

Ford 2018-2019 Non-FCW models.

This filter was probably created by first forming a filter of Fords for 2018 and 2019 that follows:



And then reducing this list to the applicable models.

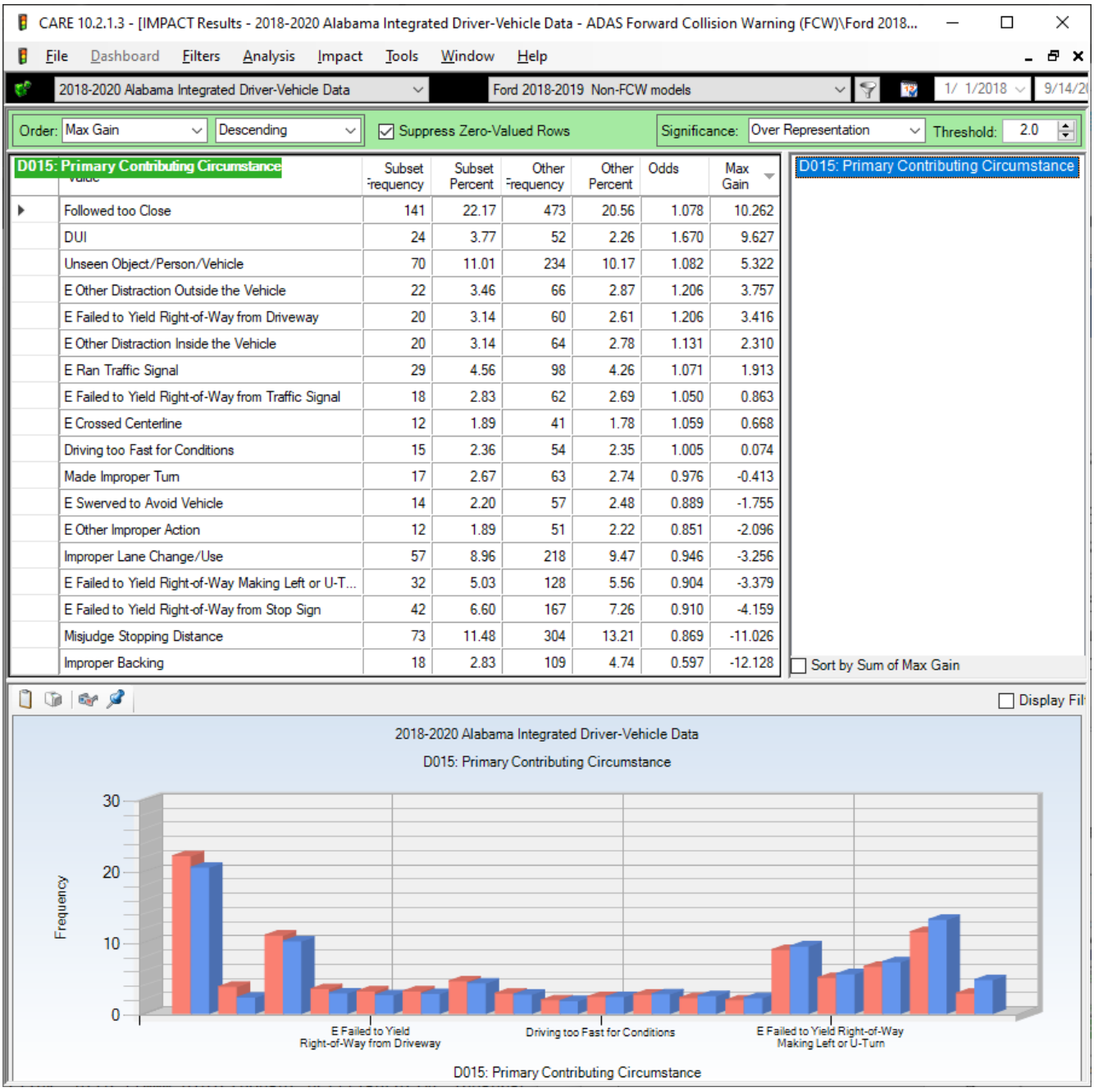
Summary of Findings and Results

The time frame of this study was slightly different for the FCW and the non-FCW vehicle-crashes. The major portion of the FCW crashes (Toyotas) were in 2019 (full year) and 2020 (about 8.3 months). For the Ford non-FCW crashes, the time frame was 2018 (about 6 months), 2019 (full year), and 2020 (about 8.3 months). The fact that the time frames are not exact is not a problem in that some such studies might even be of a before and after nature. To simplify the discussion below, we will call the time frames to be comparable at "two years," which will provide a good sense for the duration of the crash savings by type. The following lists the major findings by attribute corresponding to the IMPACT studies in the next section.

- D015, Primary Contributing Circumstances (PCC) contains several crash types that would be affected by FCW. Of these, the PCC showed improvement (reductions in the proportions as measured by the Max Gain) in crashes caused by: (1) Following too Close – Max Gain = 10.3; (2) Unseen Object/Person/Vehicle — 5.3; (3) Other Distraction Outside the Vehicle – 3.8; and (4) Other Distraction Inside the Vehicle – 1.1. While the proportional reduction of each of these was not large, collectively, the total Max Gain in reduced crashes from all four applicable crash types was about 21 crashes over the two year period in which these vehicle-crashes occurred.
- D023 Manner of Crash. The relevant crash types in this attribute, with their crash reductions, would include the following: (1) Rear End (front to rear) – 13.8; (2) Sideswipe, Same Direction – 7.0; (3) Single Vehicle Crash (all types) – 6.7. Collectively, this reduction during the two-year period of the study was 27.5 crashes, which is quite close to those reduced according to the PCC discussed above.
- D025 Crash Severity. All of the injury severities were reduced. This could be due to the warnings enabling the drivers to take preventive action to mediate the effects of the crashes if the crash was not prevented altogether by the FCW. The savings indicated are 4.0 Fatal Injury crashes, 2.7 Suspected Serious Injury, 30.3 Suspected Minor Injury (statistically significant). The collective of these were also significant as given by the increase in the Property Damage Only crashes, which amounted to 33.3 crashes in the relevant vehicles over the two years of data.

IMPACT Displays

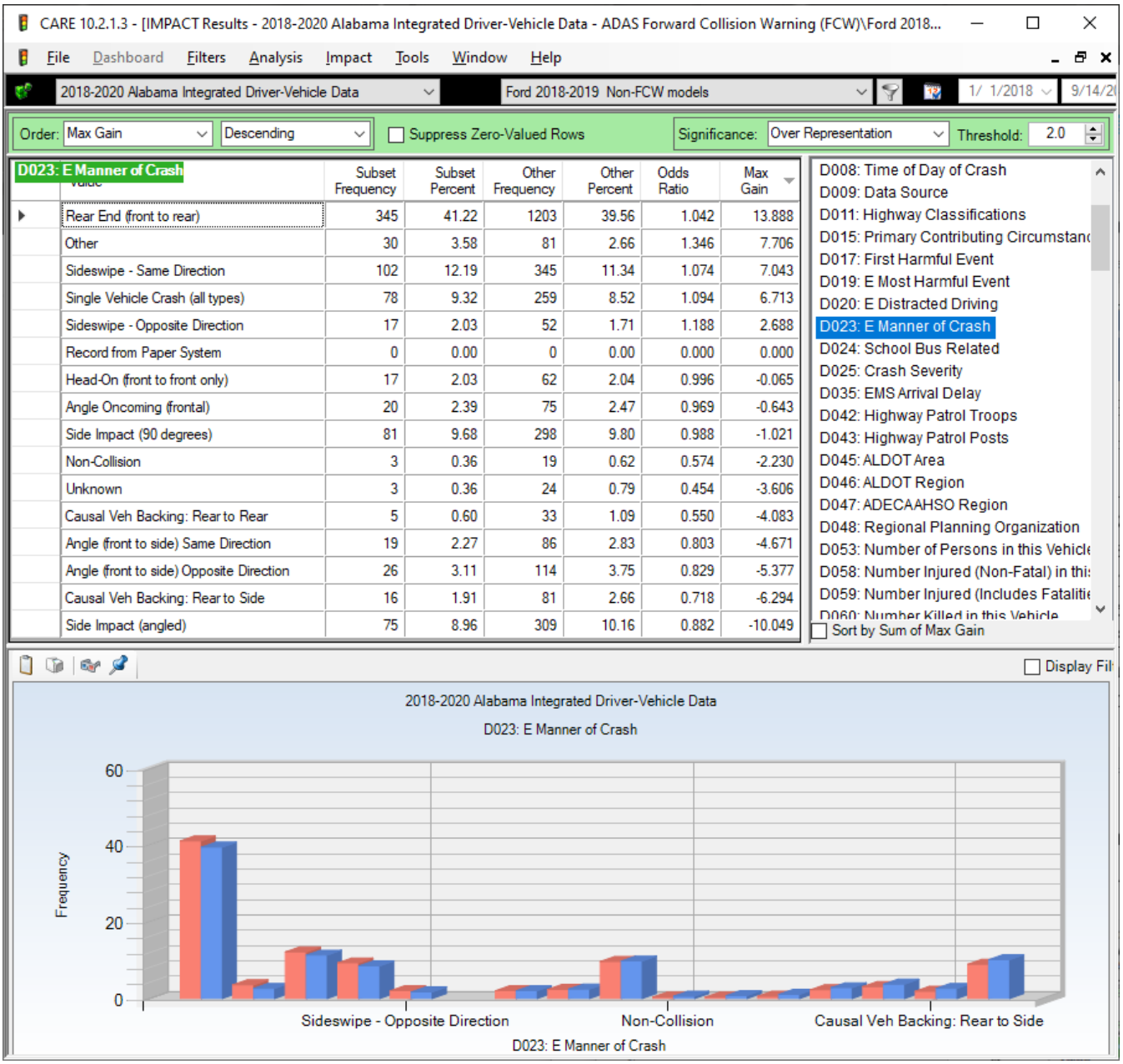
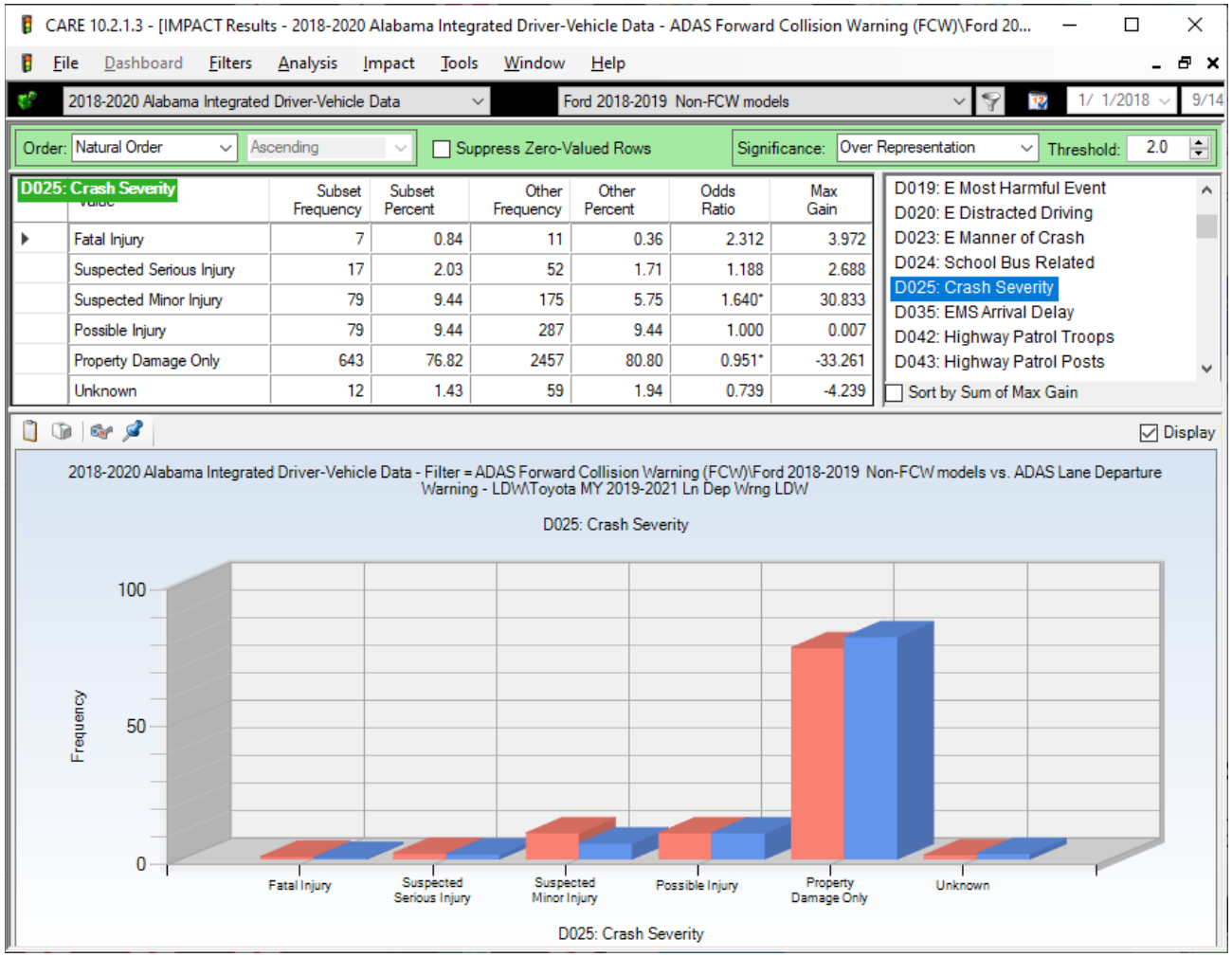
D015 Primary Contributing Circumstances



D015: Primary Contributing Circumstance	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain
Followed too Close	141	22.17	473	20.56	1.078	10.262
DUI	24	3.77	52	2.26	1.670	9.627
Unseen Object/Person/Vehicle	70	11.01	234	10.17	1.082	5.322
E Other Distraction Outside the Vehicle	22	3.46	66	2.87	1.206	3.757
E Failed to Yield Right-of-Way from Driveway	20	3.14	60	2.61	1.206	3.416
E Other Distraction Inside the Vehicle	20	3.14	64	2.78	1.131	2.310
E Ran Traffic Signal	29	4.56	98	4.26	1.071	1.913
E Failed to Yield Right-of-Way from Traffic Signal	18	2.83	62	2.69	1.050	0.863
E Crossed Centerline	12	1.89	41	1.78	1.059	0.668
Driving too Fast for Conditions	15	2.36	54	2.35	1.005	0.074
Made Improper Turn	17	2.67	63	2.74	0.976	-0.413
E Swerved to Avoid Vehicle	14	2.20	57	2.48	0.889	-1.755
E Other Improper Action	12	1.89	51	2.22	0.851	-2.096
Improper Lane Change/Use	57	8.96	218	9.47	0.946	-3.256
E Failed to Yield Right-of-Way Making Left or U-T...	32	5.03	128	5.56	0.904	-3.379
E Failed to Yield Right-of-Way from Stop Sign	42	6.60	167	7.26	0.910	-4.159
Misjudge Stopping Distance	73	11.48	304	13.21	0.869	-11.026
Improper Backing	18	2.83	109	4.74	0.597	-12.128

The above display had all crash types with less than 10 crashes eliminated.

D023 Manner of Crash



D025 Crash Severity