

# The Impact of FTx in VHF Contests with a Look at Recent Results from the Analog Only Contest Categories

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ARRL Contest Advisory Committee VHF+ Subcommittee:

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## Introduction:

This paper was originally presented at the 2022 Central States VHF Society Conference held in La Crosse, Wisconsin. Since that time the contesting community has gained experience with the new Analog Only operating categories based on the 2022 June, September, and 2023 January ARRL VHF contests. Contest data from these three most recent contests has been added to updated this paper.

## Summary and Background:

In response to a large number of comments on the use of digital modes, primarily concerning the decline in analog QSOs, the American Radio Relay League (ARRL) asked the Contest Advisory Committee (CAC) to review the topic, and the CAC then asked the standing CAC VHF+ contest subcommittee to help. This report contains a discussion of that work to date including results from a survey of VHF Contesters conducted in December 2021, as well as data mining and analysis of publicly available contest data. We have chosen representative data to show as the entire set of data is too large to conveniently put in a proceeding. The included data clearly shows trends and answers many questions about the use of FT8 in recent contests.

We began our effort by trying to define, in as objective a way as possible, the impact on VHF+ contesting from the use of FTx (i.e., “digital”, x can equal 4 or 8) modes. We addressed this issue by analyzing available contest data both before and after the introduction of the FTx modes into VHF+ contesting, a task we refer to as data mining, and by compiling, distributing, and analyzing a survey of VHF+ contesters who submitted a contest log in VHF+ contests in the past five years. The majority of this report deals with the data mining and results of the data survey.

Finally, we came to a proposal to implement analog-only categories for the single operator categories, which was approved by the CAC as well as the PSC, and has been implemented by ARRL contest staff. While the changes for adding the new analog-only categories have been completed the subcommittee is continuing to monitor its impact and the use of digital modes in contesting.

### Impact to VHF+ contesting from FTx: Addressing our assigned task:

With the introduction of WSJT-X in July 2017, the FT8, and to a lesser degree the FT4 portion of that weak signal processing software, has seen increasing use in the ARRL VHF+ contests. This increased use of FT8 has resulted in a significant impact to the contests in both a negative and a positive way. This, in turn, has generated a lot of comments to the ARRL Board of Directors, to the PSC, and to CAC members. In turn, this led to tasking the VHF+ subcommittee to evaluate the impact of the use of the FTx modes and to make objective recommendations back to the CAC and PSC as to how best to deal with these impacts.

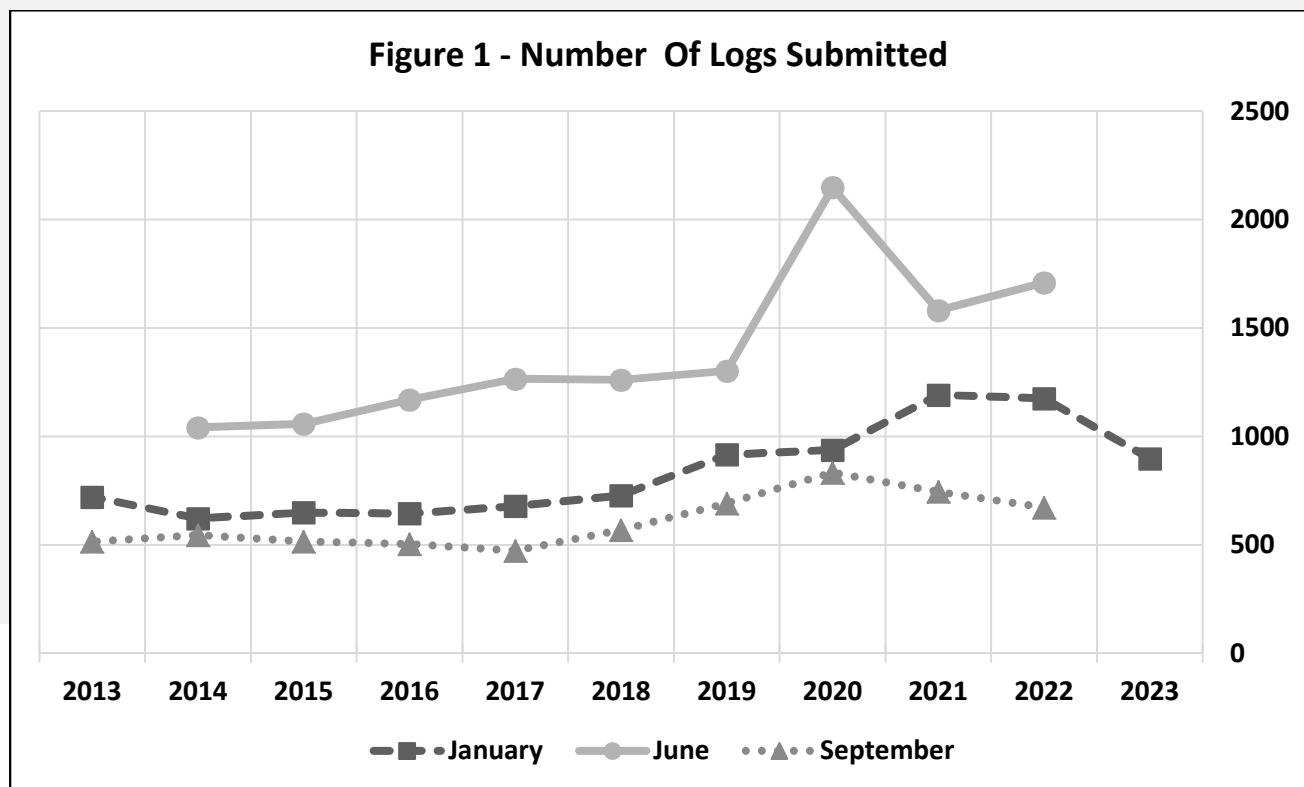
The VHF+ subcommittee spent several months in discussion regarding how to tackle this complex and often passionate issue around the use of these digital modes in VHF+ contesting. We determined that we needed to look at actual contest data to determine what trends were occurring before and after July 2017, the date WSJT-X and FT8 became available to use in VHF+ contesting. We refer to this work as data mining. The data we looked at is available in various forms at the [ARRL.org](http://ARRL.org) web site.

Before beginning the data mining, we created several questions that we were seeking to address with the effort. It is clear that the use of FT8 has dramatically increased the number of logs entered in the contest. Other impacts are not so clear cut. Questions of importance we wanted to answer, by data mining, include: How has the use of FT8 impacted the total number of QSOs made? How has it impacted the number of QSOs made per entrant? How has it impacted rover activity? How has it impacted club competition? How has it impacted the number of QSOs made on the higher, particularly microwave, bands? To answer these questions, we dove in and reviewed contest data from the four years prior to and the four years following the July 2017 introduction of WSJT-X for the January, June, and September ARRL VHF contests, data from 24 contests. This updated report has added data from the 2022 contest season as well as from the January 2023 contest.

The VHF+ subcommittee also wished to better understand the opinions, both positive and negative, of our membership. Thus, we asked the League, and received their full support, to conduct a survey of VHF contesters to evaluate how people currently operate, how they want to operate, and to gauge their sentiments and ideas for change.

### The Impact to VHF+ Contesting from FTx: Data Mining

The first question we asked was “What is the number of logs submitted for each contest? Data for logs submitted to each of the three contests by year are shown in Figure 1. The data shows a slow increase in logs submitted since the use of FT8 became widespread, with the exception of the drop from 2020 to 2021 in the June contest. This drop is likely due to widespread Es propagation in the June 2020 contest. Prior to July 2017, the logs submitted for the September and January contests had stagnated. The use of FT8 jump-started these contests.



*Figure 1-* Logs submitted to the January, June, and September ARRL VHF contests for the four years prior to the introduction of and widespread use of WSJT-X in 2017 and the five years after. The data shows a general increase in logs submitted since the use of FT8 began. The peak in the 2020 June logs submitted is likely due to widespread sporadic E during that contest.

The second question we asked was “What is the number of rover logs submitted in each contest? Rover activity is a good indicator of the health of a contest, as many entrants

rely on rovers for QSOs and multipliers from grids sparsely populated with VHF operators. The number of rover logs over this time has generally increased, although they appear to have stagnated for the September contest. Again, there is a peak in June 2020, likely caused by widespread Es. Digital activity by rovers has lagged activity by entrants in other categories, with 40% of rovers using a digital mode. This result is not too surprising, as the logistics of implementing a digital station in a rover are a bit more complex than implementing them in a fixed station.

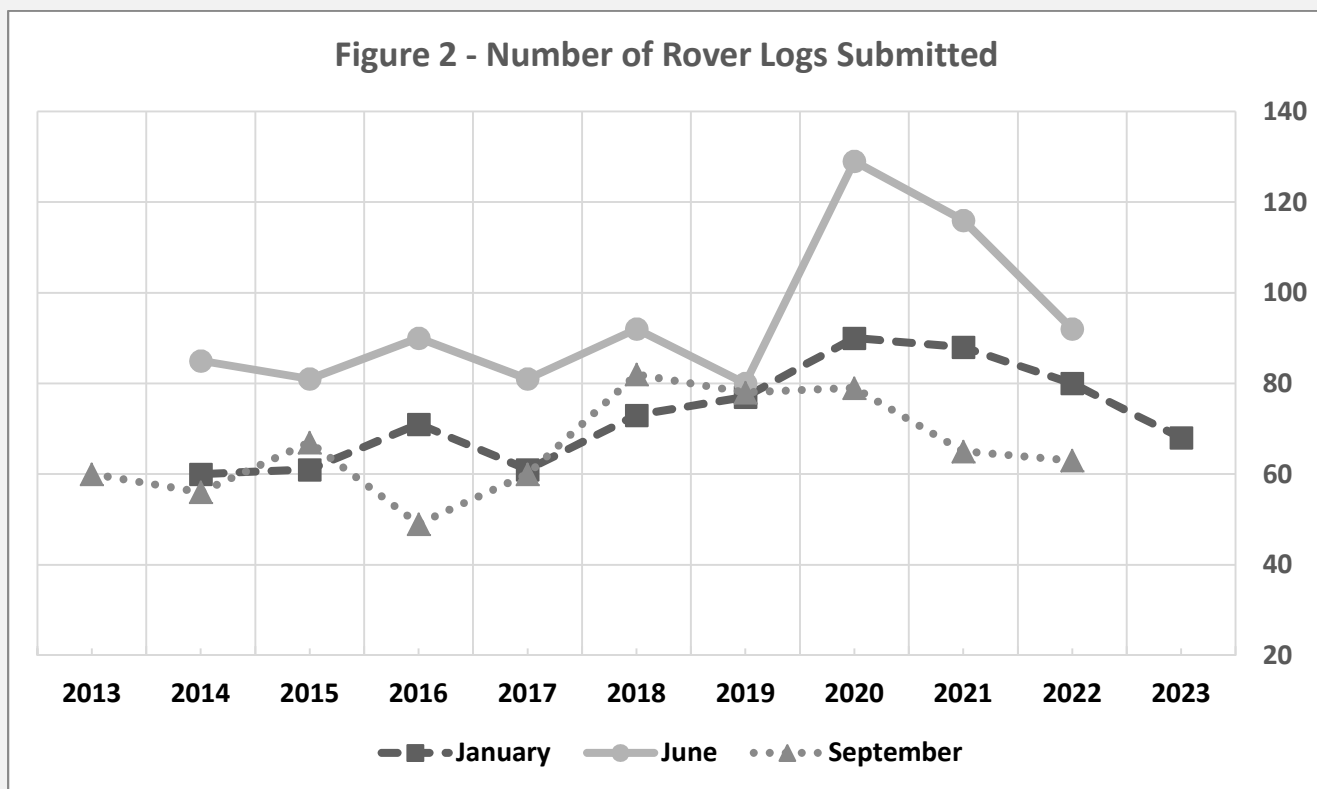


Figure 2 – The number of rover logs (all rover categories) submitted in the January, June, and September ARRL VHF+ contests for the four years prior to and the five years after the introduction and widespread use of FT8 in July 2017. The number of rover logs over this time has generally increased. Again, note the peak in June 2020, likely caused by widespread Es.

The third question we asked was “What is the number of club entries for each contest?”. Club competition is a proven indication of the health, that is activity, of a contest. Figure 3 shows the results of our data mining efforts into the club competitions, which indicates a rising number of club entries since the introduction of and widespread use of FT8. This trend is clear for the January Contest, which has traditionally been the contest in which club competition has been emphasized, but it has also increased in September. The June club entries have generally increased, but there are significant, and high, variations in the data, presumably due to sporadic E propagation being more common in those years.

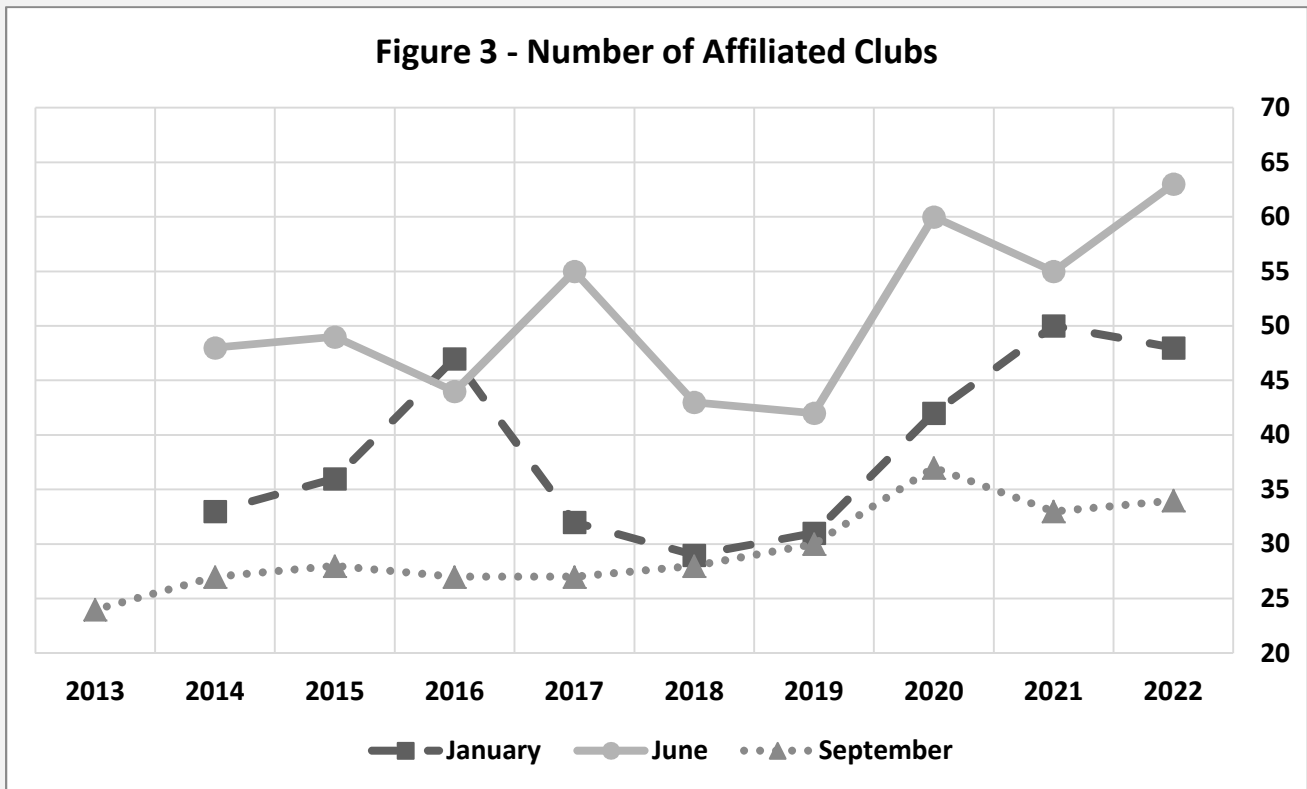
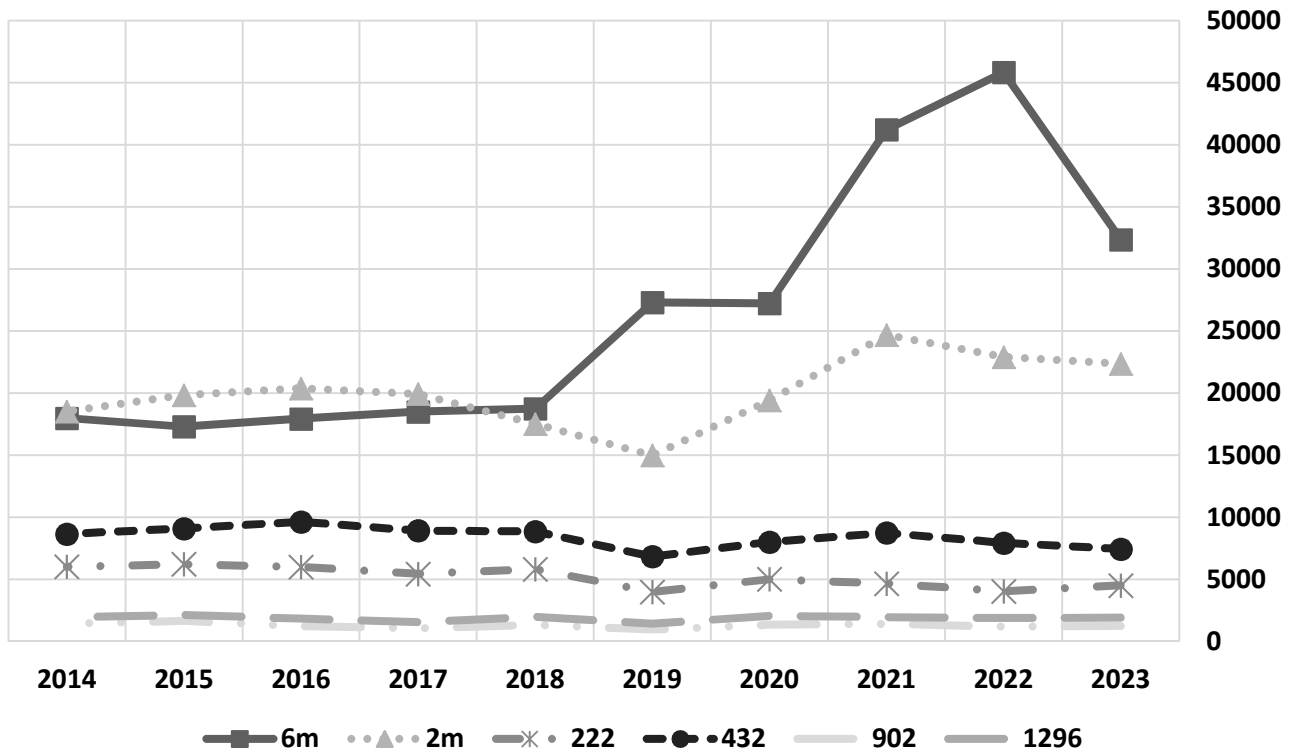


Figure 3 – The number of club entrants in the club competition submitted in the January, June, and September ARRL VHF+ contests for the four years prior to and the five years after the introduction and widespread use of FT8 in July 2017. Historically, the club competition has been an excellent indication of the health of VHF contesting. The club entries have increased over the period in question, which is a good indication that the VHF+ contests are healthy.

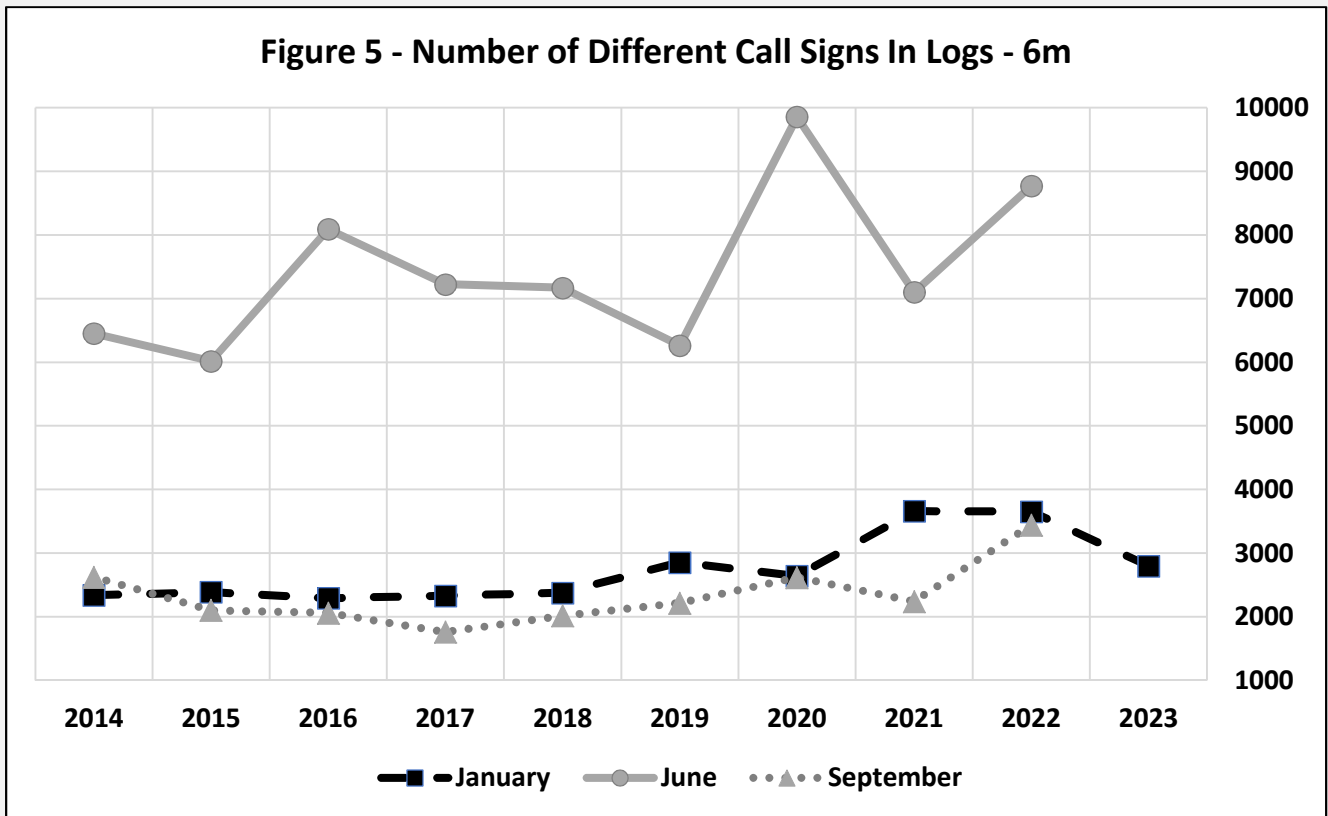
The fourth question we asked was “What is the number of QSOs, made by contest by band, for each contest?” There was some concern that the FTx activity on 6M was siphoning off activity from other bands. That data for January is shown in Figure 4. As can be seen from the data, the total number of contacts being made on 6M and 2M has increased, 222MHz has seen a decrease, while all other bands through 10GHz have been essentially flat or shown a slight increase. In the case of 6M, the increase is significant, slightly over double that before 2017, and the 2M QSO total has increased by 20% with an upward slope. The decline in 222MHz activity is disturbing, but there may be factors other than the use of FT8 in play, including the rising popularity of the SO3B category.

**Figure 4 - January Contest: Number Of Contacts By Band**



*Figure 4 - QSOs by band for the January contests for the four years prior to and the five years after the use of FT8 became popular in July 2017. The total number of contacts being made on 6M and 2M has increased, 222 has seen a slight decrease, while all other bands through 10GHz have been essentially flat.*

The fifth question asked was “Within the submitted logs how many different call signs are there for each contest?” The answer to this question should give us some idea of how many newcomers to VHF+ contesting is being attracted due to the use of FT8. There has been modest increase in the number of different calls logged on 6m for all three contests.



*Figure 5 - The number of different calls on 6M in logs submitted for the January, June, and September ARRL VHF+ contests, spanning the four years before and five years after the use of FT8 became popular. Generally speaking, there has been a slight upward trend in the number of different, or unique, calls worked in all three contests.*

One common observation about the VHF+ contests since the use of FT8 became widespread is that there are few if any analog QSOs available. We looked at the contest data by mode to quantify this observation. As mode data is not required in the submitted log, one should be cautious in taking this data as an exact measure of mode activity. It, however, should be good to use for identifying trends. Logs generated by WSJT-X accurately reflect mode as all QSOs are entered into the WSJT-X log as DG. Also note that the DG tag was only introduced into Cabrillo logging in 2016. Before that, all DG QSOs were logged as RY.

Figure 6 graphs the percentage of 6m contacts made during the three major ARRL contests using traditional “analog” modes of SSB, FM or CW while Figure 7 graphs the same information for the 2m contest contacts. Its easy to see the significant impact of FTx on how contacts are made with a shift from the traditional analog modes to digital modes. In the earlier years of FTx 20 to 30% of all 6m contacts were made on that mode while by 2021/2023 it was close to 75%. Conversely the percentage of 6m contacts

being made by traditional analog modes such as CW and SSB had dropped from about 80% to about 25%. It is important to note that while the number of contest logs submitted and the total number of contest contacts being made has increased since the introduction of FTx, the percentage of those contacts being made by traditional analog modes has decreased with the results being that those who choose not to use a computer or digital modes have felt a significant decrease in contest activity.

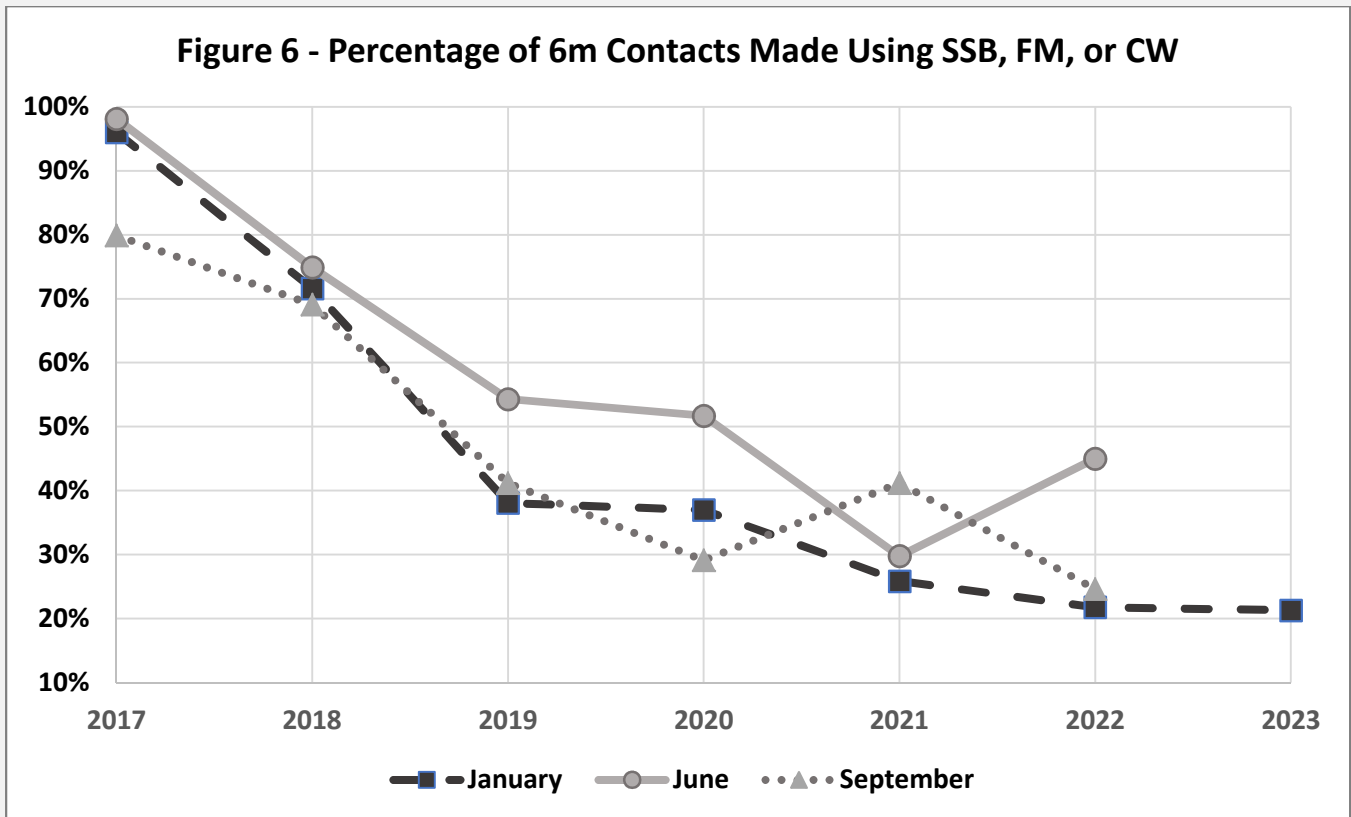


Figure 6 – Percentage on 6m contacts made in the three major ARRL VHF contests using SSB, FM or CW. Six meters has seen the most dramatic impact from FTx.



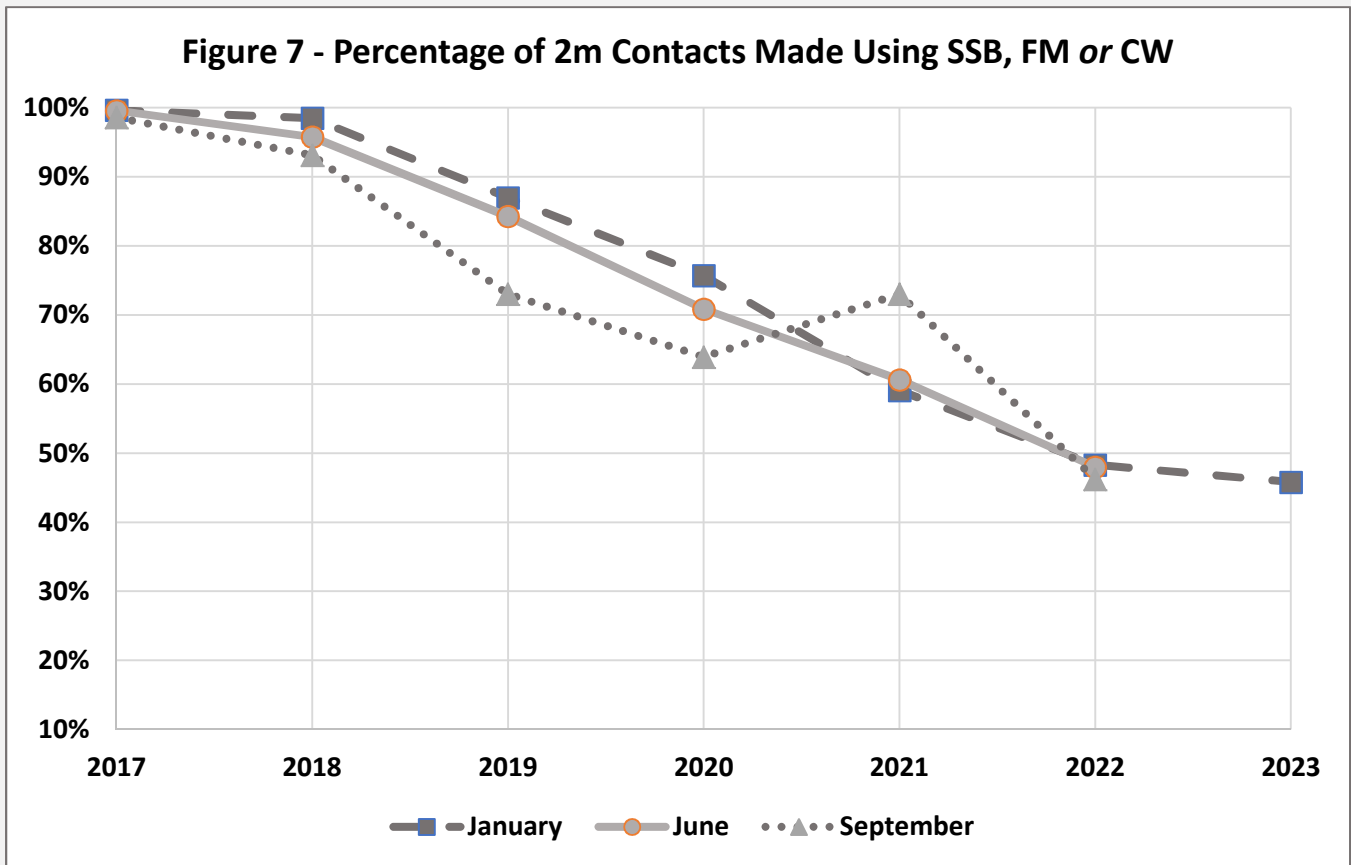
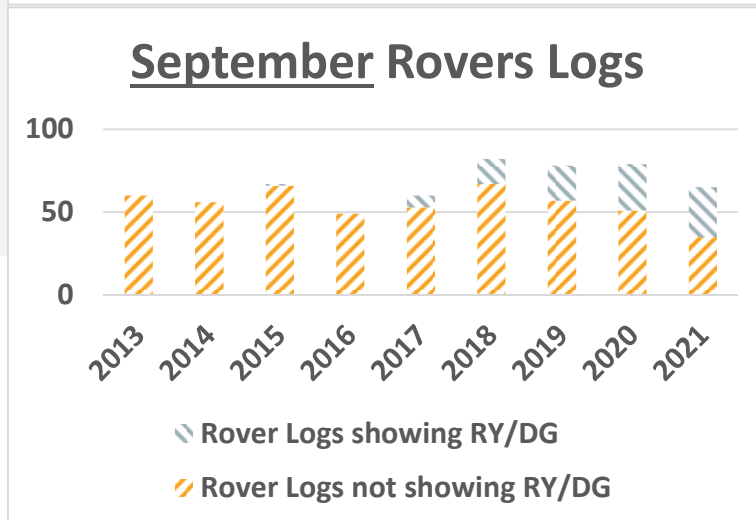
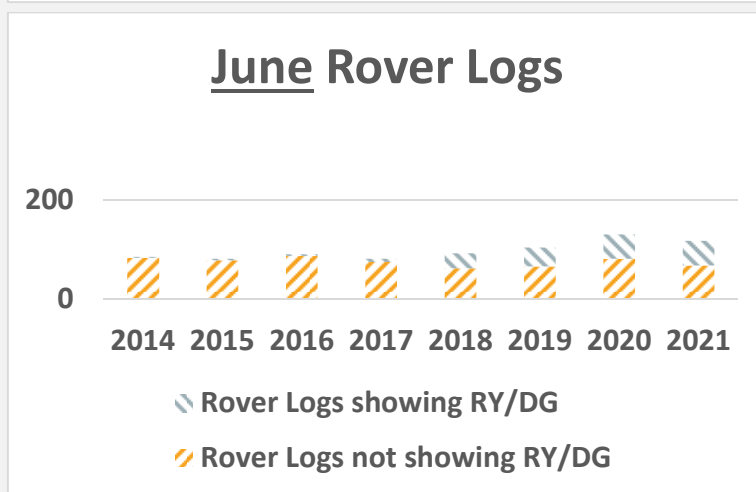
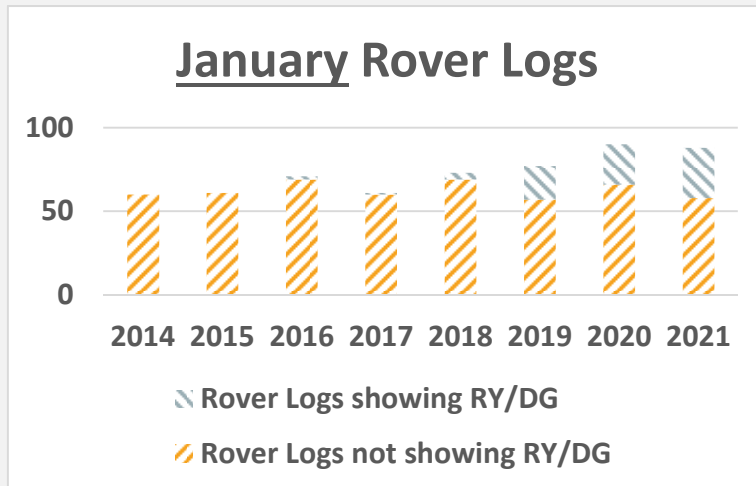


Figure 7– Percentage of 2m contacts made in the three major ARRL VHF contests using SSB, FM or CW.

There were many in the VHF+ contesting community that were concerned about the potentially negative impact that the digital modes would have on rovers. This concern appeared valid as resources are tight in a rover; and additional equipment often means additional problems that, because of the transient nature of rovers, can be hard to deal with. To get a handle on this, we asked ourselves, “How many rovers were running digital for each contest?” Figure 7 shows the submitted rover logs which contain any digital QSOs, along with those which show 100% analog QSOs. This data is shown for January, June, and September contests. While rovers have been slower to adopt the digital modes than fixed stations, there are a significant number of rovers, 30% to 40%, who operate digital modes. Also of interest is the number, although small, running digital modes prior to the introduction of WSJT-X. These are most likely meteor scatter FSK441 QSOs as rovers were early adopters of that mode.



*Figure 7* - Submitted rover logs for the ARRL January, June, and September VHF+ contests separated by some digital and 100% analog. While the rovers have been slower to adopt the digital modes, a significant number of rovers do operate them.

To summarize the salient points from the data mining effort, generally speaking:

1. Over the time period that was investigated the number of submitted contest logs has been slowly rising.
2. The total number of contacts being made on 6M and 2M has increased, 222 has seen a decrease, while all other bands through 10GHz have been essentially flat or shown a slight increase.
3. The number of submitted rover logs has slowly increased. In recent contests about 40% of all rovers used digital.
4. There has been a slight increase in the number of different call signs collectively logged with the exception of 3456, 5760 and 10 GHz, which have shown a slight decrease.
5. In recent years about 70% of the 6M contacts and about 40% of the 2M contacts were made on digital. Fewer than 10% of all the 222 and 432 contacts were made using digital; but that trend has been increasing.

## VHF Contesters Opinion Survey

In December 2021 the VHF+ subcommittee worked with the CAC and the League to design an opinion survey on the use of digital modes in the ARRL January, June and September VHF contests. The survey contained 18 different questions, including one open comment question. The survey was sent out by the ARRL using the Survey Monkey tool to over 3,500 VHF contesters who had submitted a VHF contest log in the past 3 years. Responses were not limited to this group, and anyone could access the survey and respond. From this pool the League received 1,607 responses which they fully shared with the CAC and CAC VHF+ subcommittee. This response, 45% to the requests sent out, is considered very high. We thank those who took the time to respond to the survey.

Overall, the sentiments from the survey were almost evenly divided into pro-FT8, anti-FT8 and those who supported contesting with both modes. In terms of a recommended solution, there was nothing close to a majority. The highest mentioned solution at about 15% was to separate analog from digital contesting.

## Survey Question Summary

Responses to the band usage question: 6M (96%), 2M (81%), 432 MHz(67%), 222MHz (39%), 1296MHz (30%), 902MHz(18%), 2304MHz and up (10% or less).

On 6M 30% of operators surveyed reported not using any digital modes. On 2M the reported percentage was 38%.

Of the survey respondents, 31% said that they see no need for any contest rule changes because of the use of digital modes, 45% said that they would like to see contest rules that promote the use of both analog mode and digital modes, and 24% said they would like to see only analog modes for VHF+ contesting.

41% of the survey respondents said that they are making more contest contacts now than before the use of FT8, 34% said that they are making fewer contest contacts now, and 25% said they are making about the same number of QSOs.

From rover respondents, 34% say that FT8 has had a negative impact on their operation, 21% say it has had no impact, and 21% say it has had a positive impact. 15% of rovers say that they no longer rove because of FT8 while 8% say FT8 has encouraged them to rove.

66% of all ops say they have the knowledge and insight to know when to move from the digital modes to SSB/FM/CW, 25% were not certain, and 9% said that they do not.

## Putting It All Together: The Subcommittee's Recommendation

Data mining has shown that, other than 6M and 2M analog contacts, all other indications are that VHF+ contesting is generally healthy. Currently about 25% of VHF+ contest operators use only analog modes, another 25% use only digital modes, and the remaining 50% use both modes. VHF contesters that use only digital modes, or that use both analog and digital modes, are generally accepting of the contest rules as they are today, while the VHF contesters that use only analog modes are concerned with a significant drop in their contest activity levels. Based on this work, the VHF+ subcommittee recommended that a new Analog Only operating category be created which was enacted starting with the June 2022 contest. This provides for a separate category for analog only stations to compete against other analog only stations. It is also thought that the analog only categories would entice those digital only stations (25%) and mixed mode stations (50%) to move to SSB, CW or FM in order to work "new" stations that are competing in the Analog Only category and that wouldn't otherwise be worked by digital only operators.

## The Road Ahead of Us

The subcommittee fully recognizes the difficulties associated with this topic and we do not believe that the creation of the new Analog Only operating categories will resolve 100% of the concerns, but we think it will help. The recent ARRL June VHF Contest Expanded Results article that appears on the ARRL's contest website has two graphs on page 2 of that article that show the number of 6m QSOs made per hour along with mode. From those two graphs its apparent that when 6m is showing strong sporadic Es that the usage of digital modes decreases as contest operators move to SSB/CW for high rates. During those times of peak rates on 6m, the use of digital modes dropped to 40 to 50%. Conversely, for those contests where there is no significant propagation, for example often the January contest, we expect to continue to see the strong use of FTx due to its weak signal handling advantage.

Like all of you we are excited to see how the new Analog Only category will continue to play out over the next few contests. Depending on that outcome, additional changes may be recommended.

The VHF+ Subcommittee is continuing to discuss the use of FTx in VHF+ contests, along with all other comments and concerns from VHF+ contesters.