



2019 Weather Survey

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Introduction

AOPA's 2019 Weather Survey served as a follow-up to several surveys on Weather, PIREPs and Flight Service, all conducted within the past three years.¹ The present research investigated the ways in which pilots access weather information and their needs for weather resources, including potentially retiring legacy weather products such as Wind and Temperature Aloft Forecasts (FB Winds), Weather Depiction Charts, text AIRMETs, and more. Survey results were trended over time when possible and segmented by demographics (e.g., age, pilot certificate, and location) when appropriate.

Method

A survey on weather-related topics was created using Qualtrics, an online survey tool. The survey consisted of 30 questions in total, including one specific to pilots who primarily fly in Alaska. An email invitation to take the survey was sent to a total of 3,041 AOPA members from Alaska, 1,021 pilots from Hawaii, and a random sample of about 30,000 AOPA members from the Continental United States (CONUS), for a total of 34,062 people invited to take the survey. All subjects received an additional email reminding them to take the survey in an effort to increase the sample size and decrease the related margin of error. No incentive was offered in exchange for participation.

Key Findings

1. Alaskan pilots continue to rely on the Federal Aviation Administration (FAA) weather camera website and the National Weather Service's (NWS) Alaska Aviation Weather Unit (AAWU) for weather information, both initially and immediately prior to flight. Aviation applications continue to be popular in CONUS.
2. Utilization of Flight Service has continued to decline in CONUS and Alaska. The biggest drop was in Alaska where utilization of Flight Service for initial weather briefings has decreased from 64% in 2017, to 49% in 2018, and now just 45% in 2019.
3. The FAA's FIS-B service has continued to improve and gain popularity with pilots. In 2018, Alaskan pilots were more often dissatisfied with the FAA's FIS-B service. The discrepancy in satisfaction with the service between pilots from Alaska and pilots from the CONUS has greatly diminished in the past year; Alaskan pilots are equally satisfied with the service than CONUS pilots are.
4. About 43% of pilots provide an unsolicited PIREP either sometimes, frequently, or always (a decrease of 5% from 2018). Pilots with a current instrument rating, an ATP, and based in Alaska are more likely to provide an unsolicited PIREP than other cohorts.
5. Most respondents felt they would *not* be impacted by the removal of:
 - Winds and Temperature Aloft Forecast Tables

¹ Middlestadt, S. E., Smith, T., Hu, Y., & Ison, D. (June 1, 2016). [Technical Research Report on General Aviation Pilot Beliefs About Obtaining a Standard Pilot Weather Briefing](#).

George, T., & Duke, R. (July 26, 2016). [AOPA 2016 Pilot Report Survey](#).

George, T., & Duke, R. (Aug. 4, 2017). [AOPA 2017 Weather Survey](#).

George, T., Duke, R., Davis, K., & Bell, E. (July 6, 2018). [AOPA 2018 Weather Survey](#).

- Weather Depiction Charts
 - Text AIRMETs
6. Though about 42% of respondents rarely or never check the NWS’s Watch, Warning, and Advisories when flight planning, most still believe they are relevant to their flying (48%) and find them easy to use and understand (62%).

2019 Survey Results

A total of 160 people from Alaska, 29 people from Hawaii, and 2,056 people from CONUS responded to the survey in March and April of 2019, over the course of a 4-week period. The margins of error at a 95% confidence level was: 7.5% for Alaskan pilots and 2% for CONUS pilots. The overall margin of error (considering pilots from all regions) was approximately 2% at the same 95% confidence level.

Sample Characteristics

The sample characteristics were similar to those found in AOPA’s 2017 and 2018 Weather Surveys (Table 1). About half (50%) of all subjects were private pilots. Most subjects (68%) were at least 55 years old. About half (46%) of respondents were instrument current (Figure 1). Most subjects reported flying single-engine piston, fixed gear aircraft (Figure 2).

Table 1. *Highest level of pilot certificate held.*

Certificate	AOPA 2017 Survey		AOPA 2018 Survey		AOPA 2019 Survey		FAA	
	Count	Percentage	Count	Percentage	Count	Percentage	Count	Percentage
Student	17	4%	71	2%	98	4%	167,804	26%
Sport	0	0%	19	1%	16	0.7%	6,246	1%
Recreational	0	0%	4	0.1%	3	0.1%	144	0.02%
Private	191	50%	1,530	54%	1,134	50%	163,695	26%
Commercial	107	28%	767	27%	619	27%	99,880	16%
ATP	63	17%	458	16%	392	17%	162,145	26%
No pilot certificate	2	1%	0	0%	5	0.2%	-	-
Total	380	100%	2,849	100%	2,267	100%	633,317	100%

Note. This table compares responses to AOPA’s 2019 Weather Survey to AOPA’s 2017 and 2018 Weather Surveys, in addition to the current FAA numbers. FAA estimated active airmen certificates accurate as of the last update (12/31/18; source: [FAA U.S. Civil Airmen Statistics](#)).

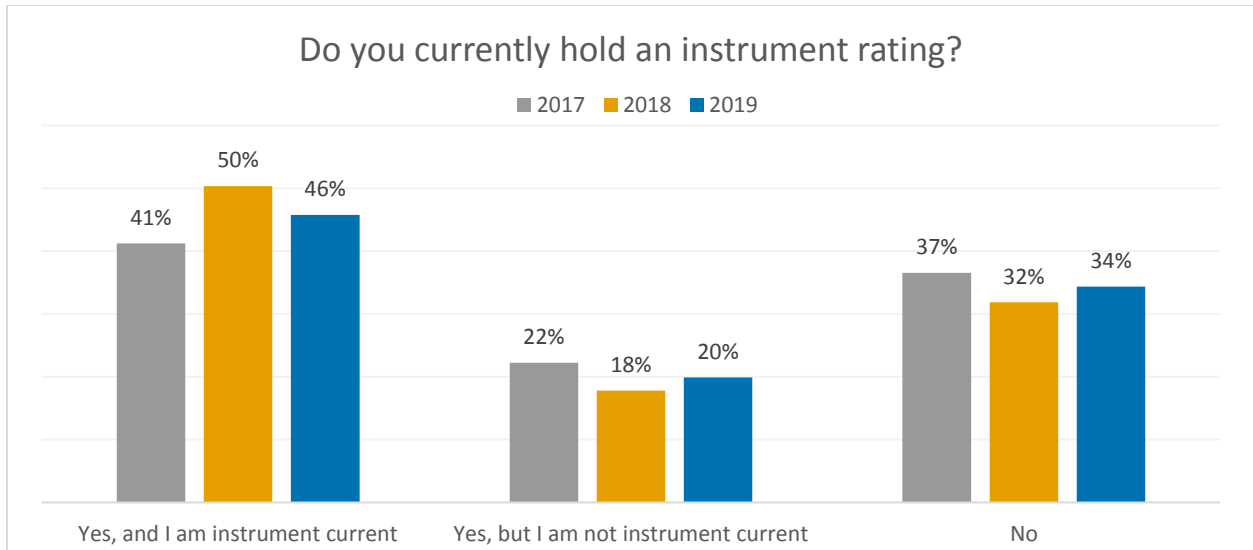


Figure 1. Number of pilots in AOPA surveys, over time, who were instrument rated (measured by responses to, “Do you currently hold an instrument rating?”; $n_{17} = 364$; $n_{18} = 2327$; $n_{19} = 2071$). Note, the FAA reports 311,017 (49% of total pilot number) instrument rated pilots, as of 12/31/18 (Source: [FAA U.S. Civil Airmen Statistics](#)).

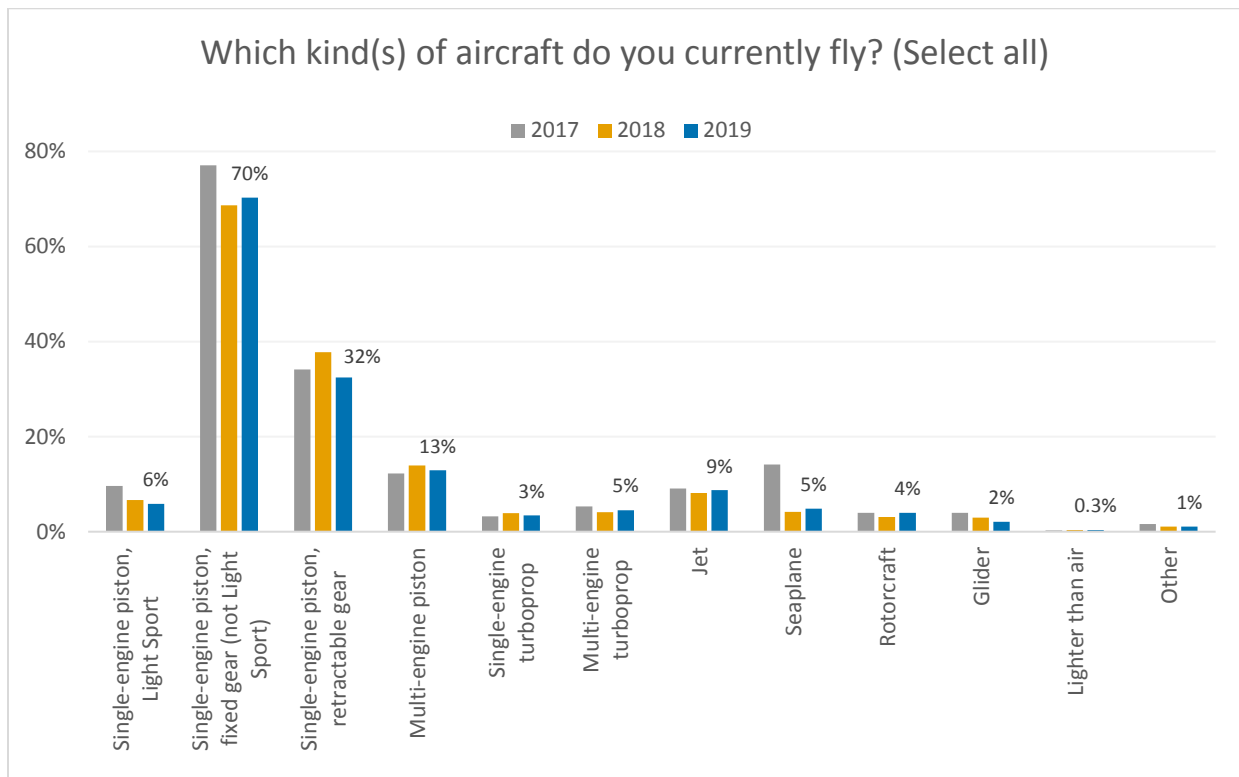


Figure 2. Responses to, “Which kind(s) of aircraft do you currently fly? (Check all that apply).” Percentages reflect the number of people who selected that response out of the total number of subjects who answered the question ($n_{17} = 375$; $n_{18} = 2344$; $n_{19} = 2073$).

Pre-Flight Weather Resources

Initial source used. Alaskan pilots used FAA weather cameras² and the AAWU³ website frequently (Figure 3). Pilots from CONUS relied on aviation applications and AWC’s website more often (Figure 4). Common fill-in responses for “other” sources used during an initial weather briefing included: publicly available weather reports (e.g., AccuWeather, Fltplan.com, Windy.com, etc.).

Notably, the percentage of pilots in both Alaska and CONUS using Flight Service for *initial* weather briefings has decreased over time. In 2017, 64% of Alaskan pilots and 54% of CONUS pilots used Flight Service. In 2018, 49% of Alaskan pilots (a decrease of 15%) and 40% of CONUS pilots (a decrease of 14%) used Flight Service. In 2019, just 45% of Alaskan pilots (a further decrease of 4%) and 37% of CONUS pilots (a further decrease of 3%) used Flight Service for initial pre-flight planning.

Aviation applications (e.g., ForeFlight, Garmin Pilot) seem to be a less popular resource for initial weather briefings in Alaska currently than they were two years ago; however, applications continue to be popular immediately prior to flight and the rankings have remained consistent year over year. Aviation applications are still the most commonly used source for initial pre-flight planning by pilots from CONUS.

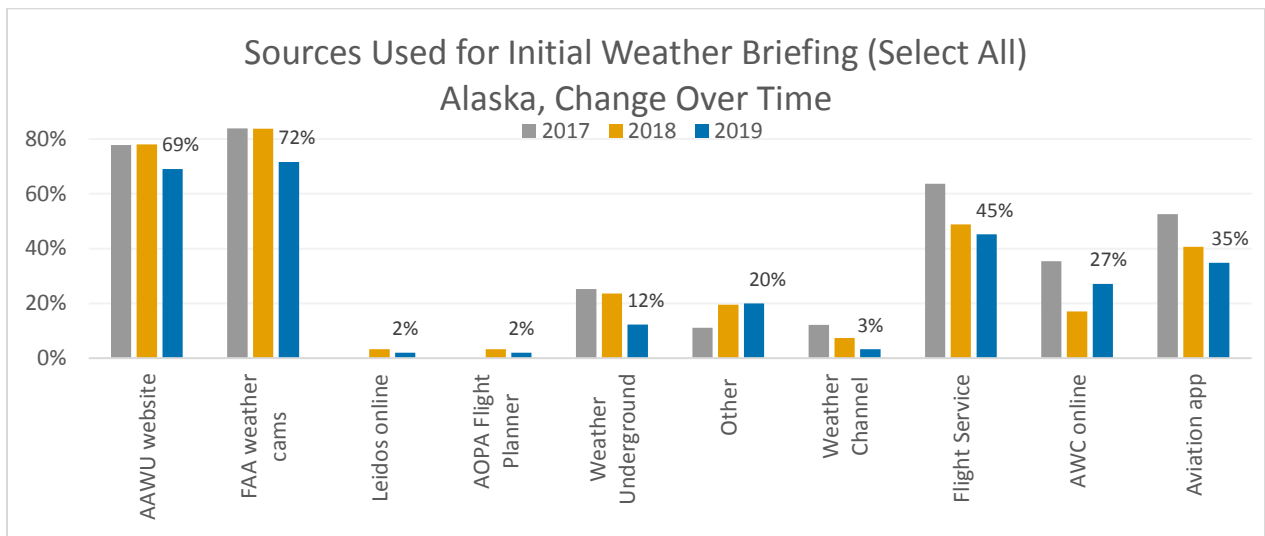


Figure 3. “What weather source(s) do you use for your initial weather briefing during pre-flight planning? (Select all that apply).” Percentages reflect the number of people who selected that response, out of the total number of people who answered the question, for Alaskan respondents. Sample sizes were as follows: $n_{17} = 99$; $n_{18} = 123$; $n_{19} = 155$. Common “other” responses in 2019 included: windy.com (4/30 comments) and AeroWeather (4/30 comments).

² The FAA Weather Camera Program is an Alaska based activity that provides web camera views at over 220 locations across the state, updated every 10 minutes, as a supplementary FAA product to improve situational awareness regarding weather conditions for aviation use. For more info see: avcamsplus.faa.gov.

³ The NWS operates a forecast office in Anchorage, Alaska, the Alaska Aviation Weather Unit, which generates aviation weather forecasts.

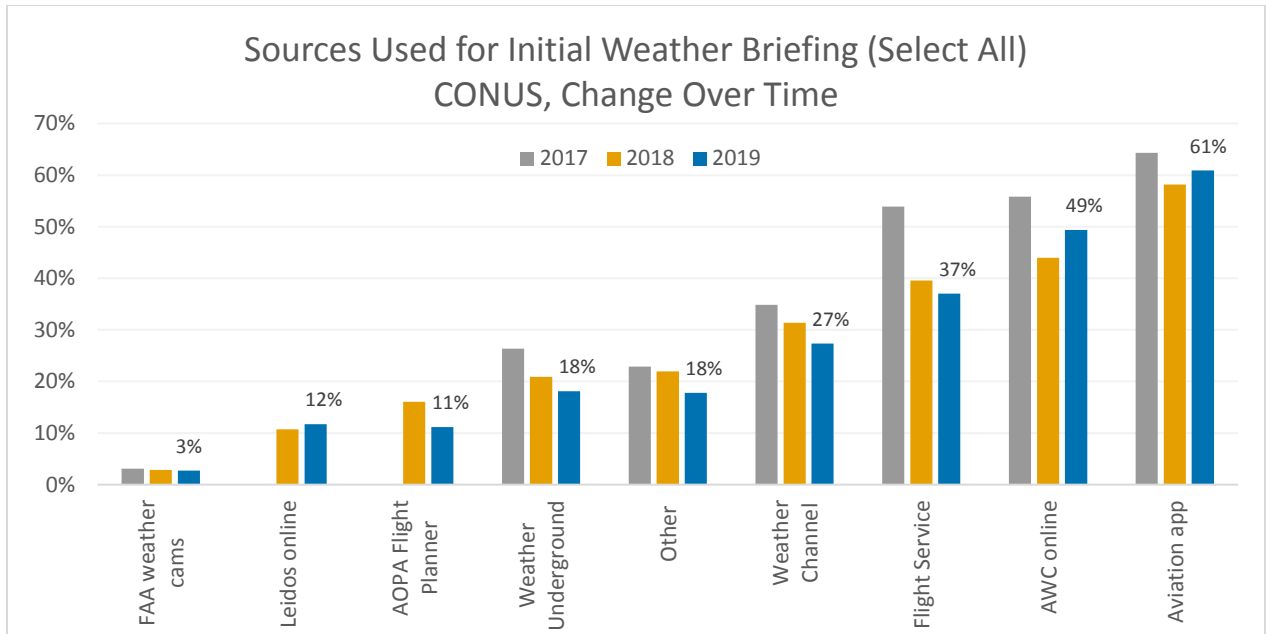


Figure 4. “What weather source(s) do you use for your initial weather briefing during pre-flight planning? (Select all that apply).” Percentages reflect the number of people who selected that response, out of the total number of people who answered the question, for respondents from CONUS. Sample sizes were as follows: n₁₇ = 258; n₁₈ = 2650; n₁₉ = 2003. Common “other” responses in 2019 included: fltplan.com (43/339 comments), AccuWeather and other local TV (26/339 comments), windy.com (21/339 comments), and WeatherSpork (14/339 comments).

Sources used immediately prior to flight. Pilots from all locations were more likely to use Flight Service immediately prior to flight than for initial pre-flight planning. Alaskan pilots used FAA weather cameras frequently, perhaps because of the 10-minute update cycle (see Figures 5-6). CONUS pilots, who do not have access to FAA weather cameras⁴, relied on aviation applications such as ForeFlight and Garmin Pilot (Figures 7-8). These findings echo those of last year.

⁴ There are no FAA weather cameras outside of Alaska at this time.

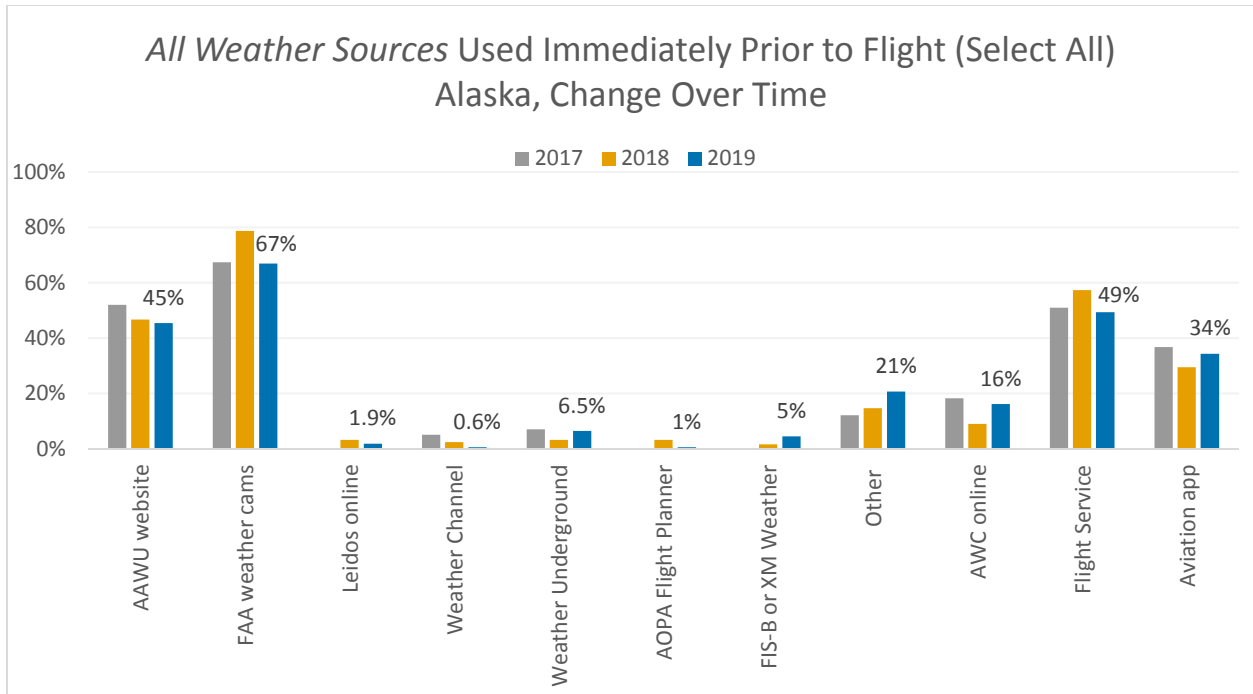


Figure 5. “What weather source(s) do you use immediately prior to flight under challenging conditions? (Select all that apply).” Percentages reflect the number of people who selected each option, out of the total number of subjects in Alaska. Sample sizes were as follows: $n_{17} = 98$; $n_{18} = 122$; $n_{19} = 154$.

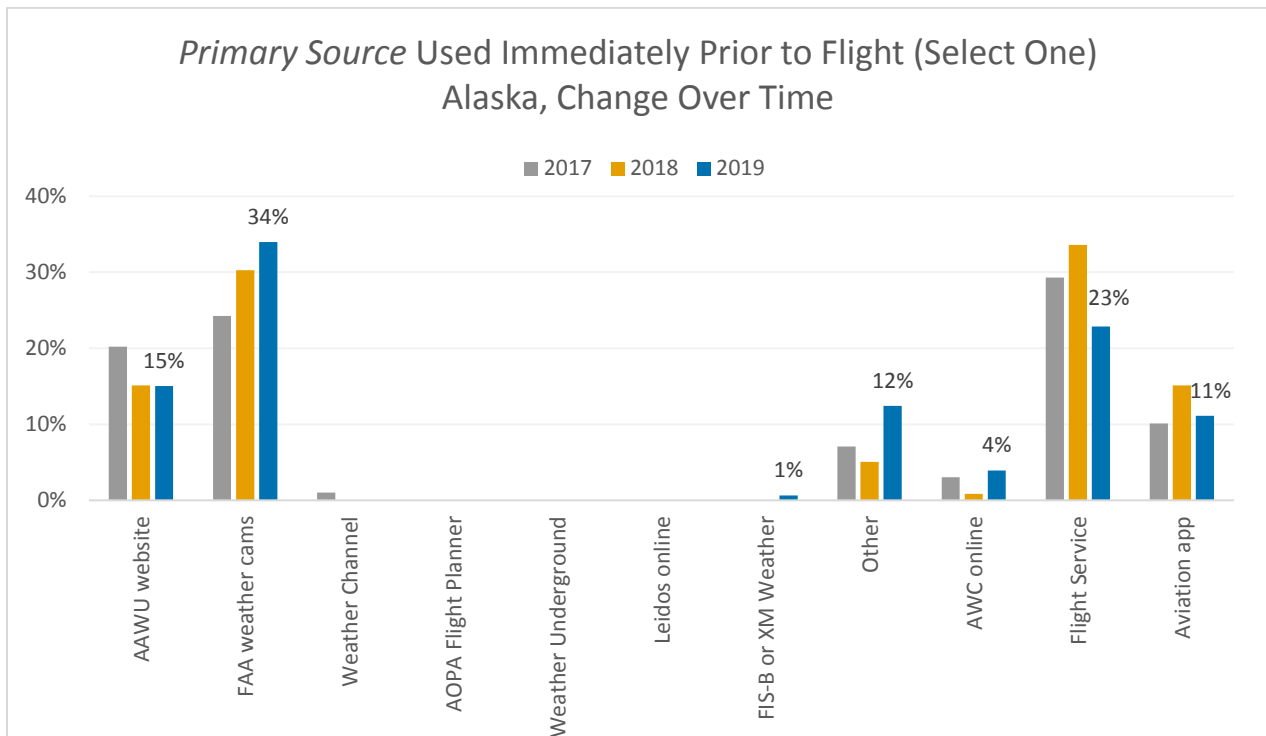


Figure 6. “What is the **primary** source you use to check the weather immediately prior to flight under challenging conditions? (Select one).” Results for Alaskan pilots only. Sample sizes were as follows: $n_{17} = 99$; $n_{18} = 119$; $n_{19} = 153$.

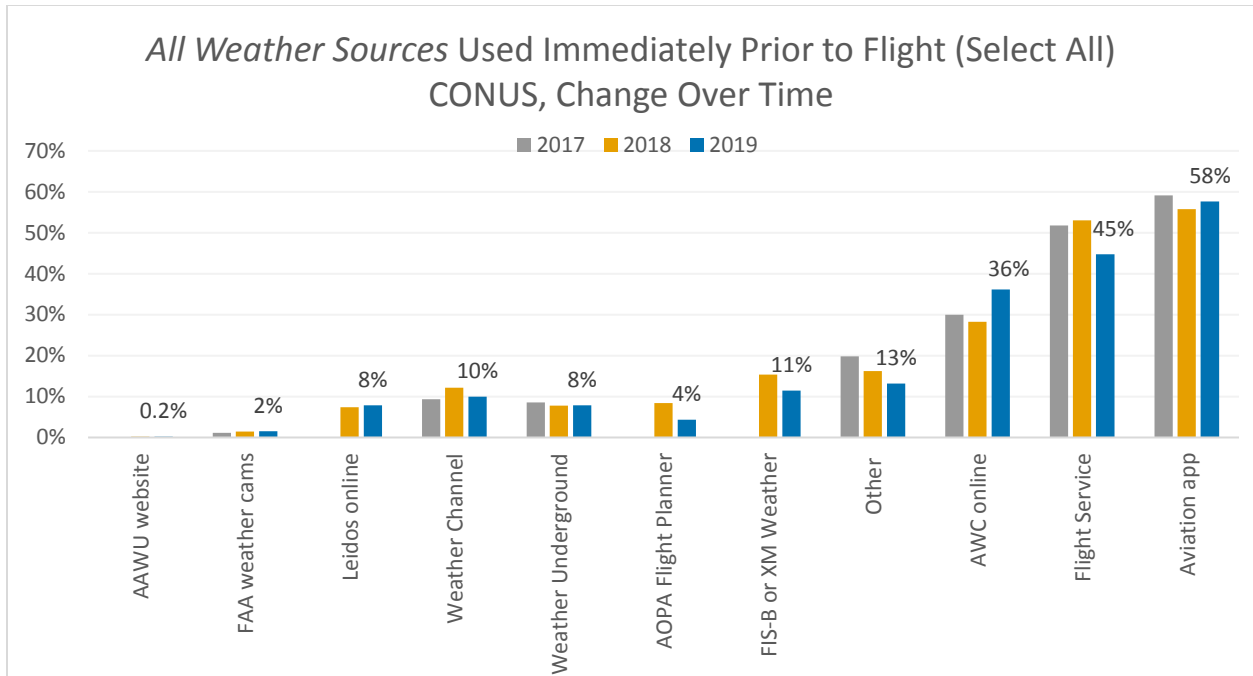


Figure 7. “What weather source(s) do you use immediately prior to flight under challenging conditions? (Select all that apply).” Percentages reflect the number of people who selected each option, out of the total number of subjects from CONUS. Sample sizes were as follows: n₁₇ = 257; n₁₈ = 2638; n₁₉ = 1991.

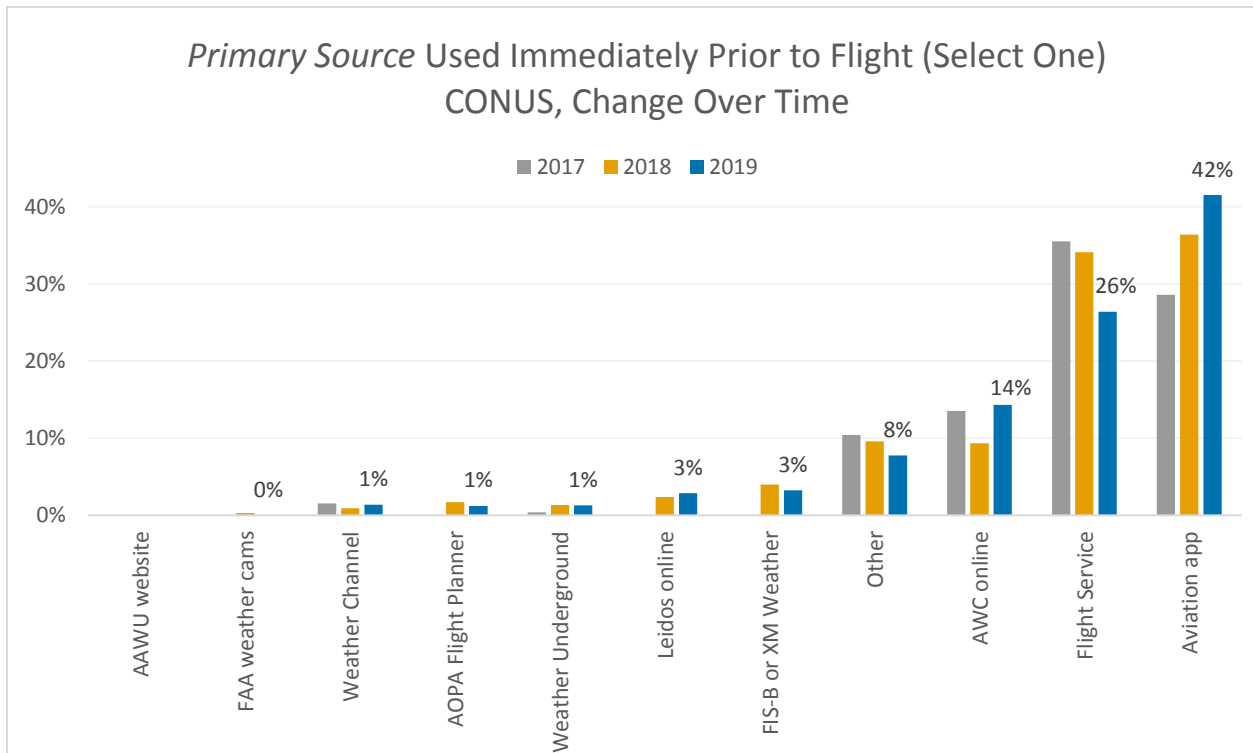


Figure 8. “What is the **primary** source you use to check the weather immediately prior to flight under challenging conditions? (Select one).” Results for CONUS pilots only. Sample sizes were as follows: n₁₇ = 259; n₁₈ = 2512; n₁₉ = 1956.

Aviation applications and Flight Service. Aviation applications (including ForeFlight or Garmin Pilot) and Flight Service were among the most popular sources for checking weather information immediately prior to flight – especially for pilots from CONUS. Pilots from CONUS use aviation applications now even more than they did in previous years (as seen in Figure 8, above); in 2019, 42% of pilots from CONUS listed an aviation application as their primary source of weather information – an increase of 5% from last year, and 13% from two years ago. Aviation applications have not seen such consistent adoption in Alaska. In 2017, 10% of Alaskan pilots listed an app as their primary source of weather information immediately prior to flight. The percentage of Alaskan pilots using an aviation app increased to 15% in 2017 but fell again to 11% this year (as seen in Figure 6, above).

The percentage of pilots from all locations relying on Flight Service immediately prior to flight decreased from 2018 to 2019. In 2018, 34% of CONUS pilots and 34% of Alaskan pilots listed Flight Service as their primary source of weather information. In 2019, just 26% of CONUS pilots and 23% of Alaskan pilots listed Flight Service as their primary source – a decrease of 8% for CONUS and 11% for Alaska (as seen in Figures 6 and 8, above). About 13% of all respondents in 2019 reported *not* contacting Flight Services (Figure 9, below). Of those that did contact Flight Services at some point, about 51% *always* conducted self-service planning activities beforehand.

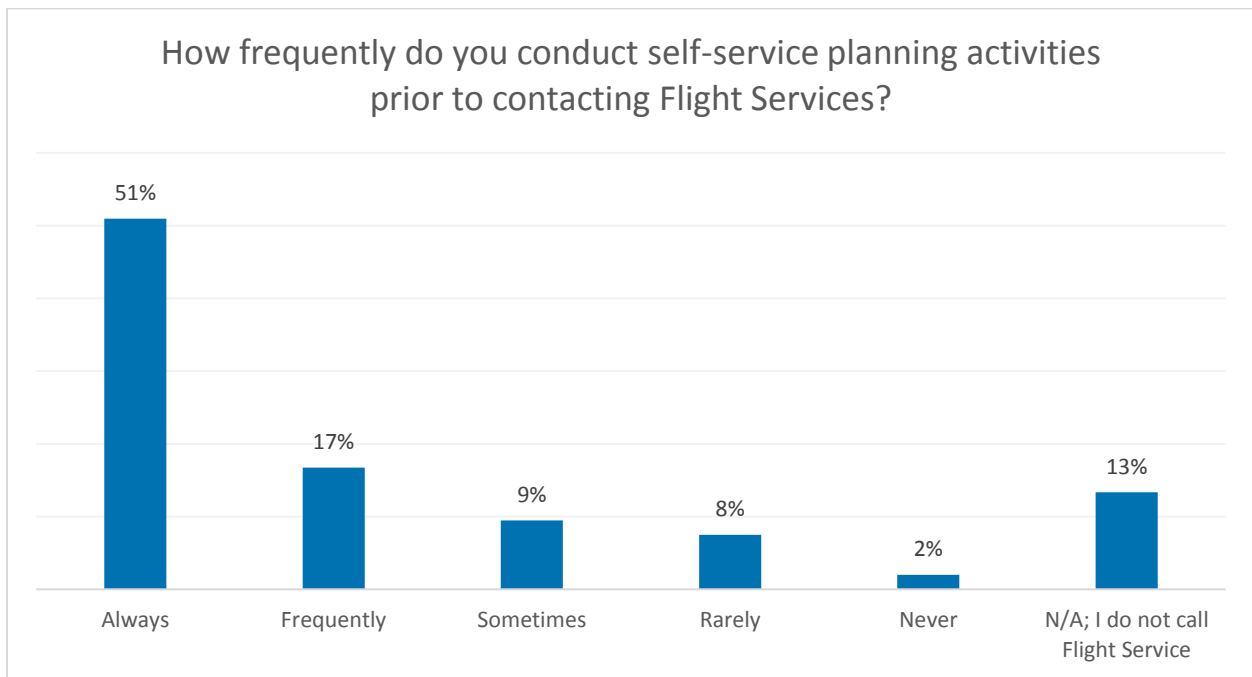


Figure 9. “How frequently do you conduct self-service planning activities prior to contacting Flight Services?” Asked in 2019 only. Including those who selected “N/A”, n = 2105. Excluding those who never contact Flight Services, n = 1824. Percentages shown above include those who selected “N/A” option.

Current, instrument rated pilots were again shown to use aviation applications more than other pilots (Figure 10, below). Pilots with no instrument rating and pilots who were instrument rated but not current were more likely to select Flight Service as their primary source of information

than current instrument rated pilots were. Use of aviation applications increased for all pilots over time, regardless of instrument rating held, while use of Flight Service decreased for all pilots over time.

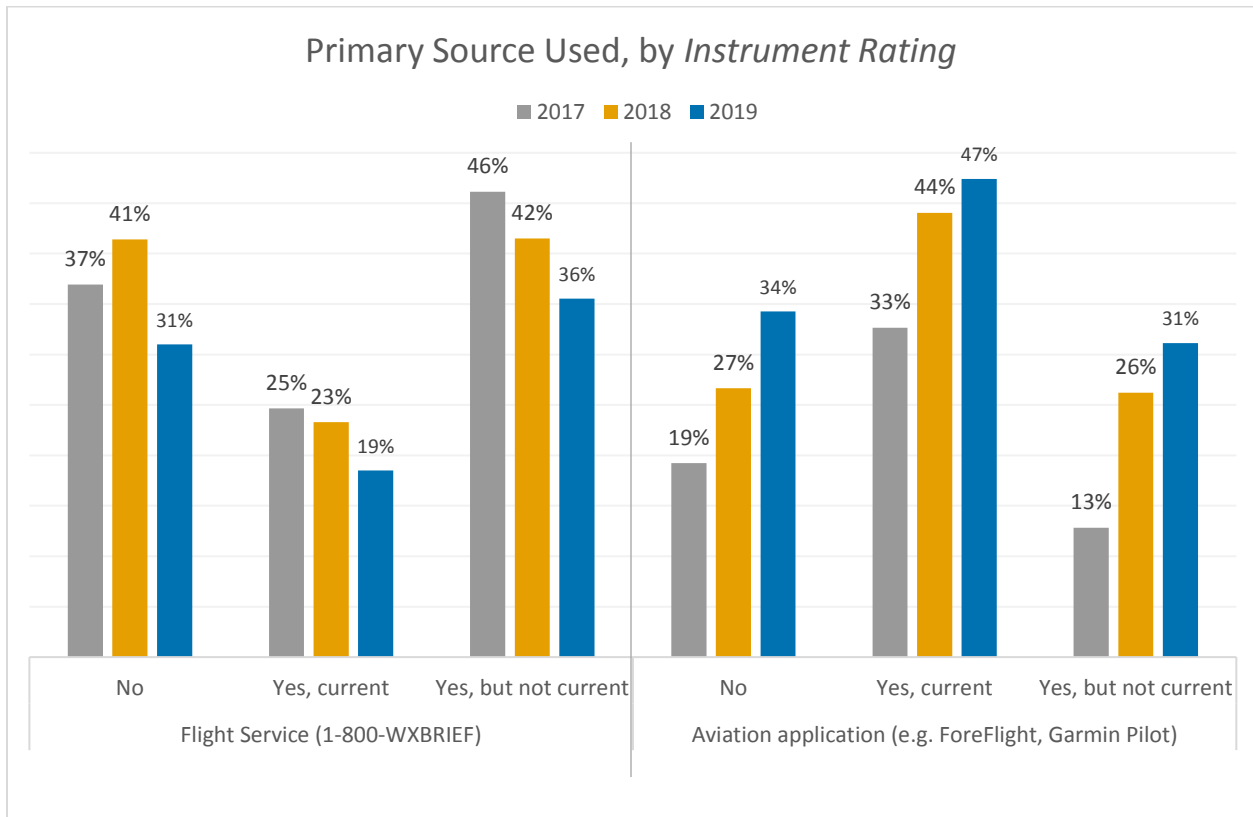


Figure 10. Top 2 most commonly selected primary sources used to check weather information immediately prior to flight, by instrument rating/currency, over time.

Younger pilots tended to rely on aviation applications more than older pilots did (Figure 11). Older subjects were more likely to list Flight Service as their primary source than younger subjects were – a trend seen last year, as well. In all age groups; however, the trend toward use of aviation apps immediately prior to flight is slightly increasing, with an accompanying decline in calling Flight Service.

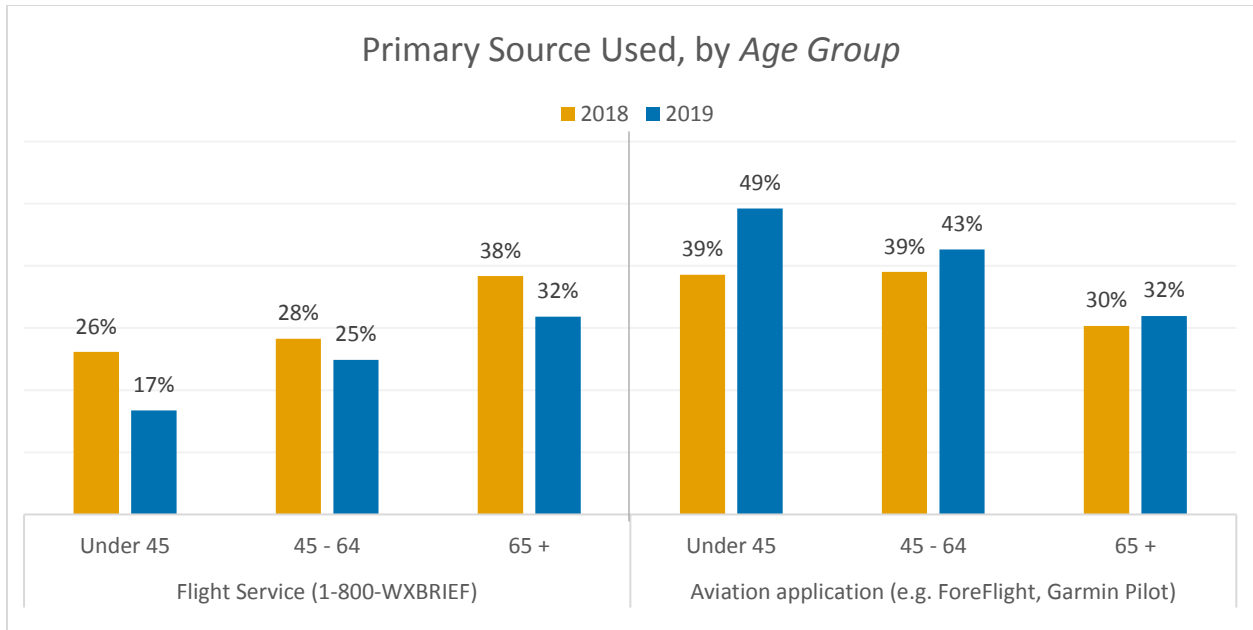


Figure 11. Top 2 most commonly selected primary sources used to check weather information immediately prior to flight, by age group, over time. The top 2 most commonly selected sources were: an aviation application ($n_{18} = 932$; $n_{19} = 839$), and Flight Service ($n_{18} = 896$; $n_{19} = 559$). Percentages reflect the number of people from each age group who selected each source, out of the total number of people in that age group.

Of those who selected Flight Service as their primary information source, 78% of CONUS pilots (a decrease of 5% from last year) and 63% of Alaskan pilots (a decrease of 17% from last year) did so for the ability to ask questions or receive a professional opinion (Figures 12, 14 - 15). The percentage of respondents who selected Flight Service because of its reliability did not change substantially over time, though reliability was still more important to Alaskan pilots than it was to CONUS pilots. About 49% of Alaskan pilots and 37% of CONUS pilots used Flight Service because of its reliability, a negligible increase over last year.

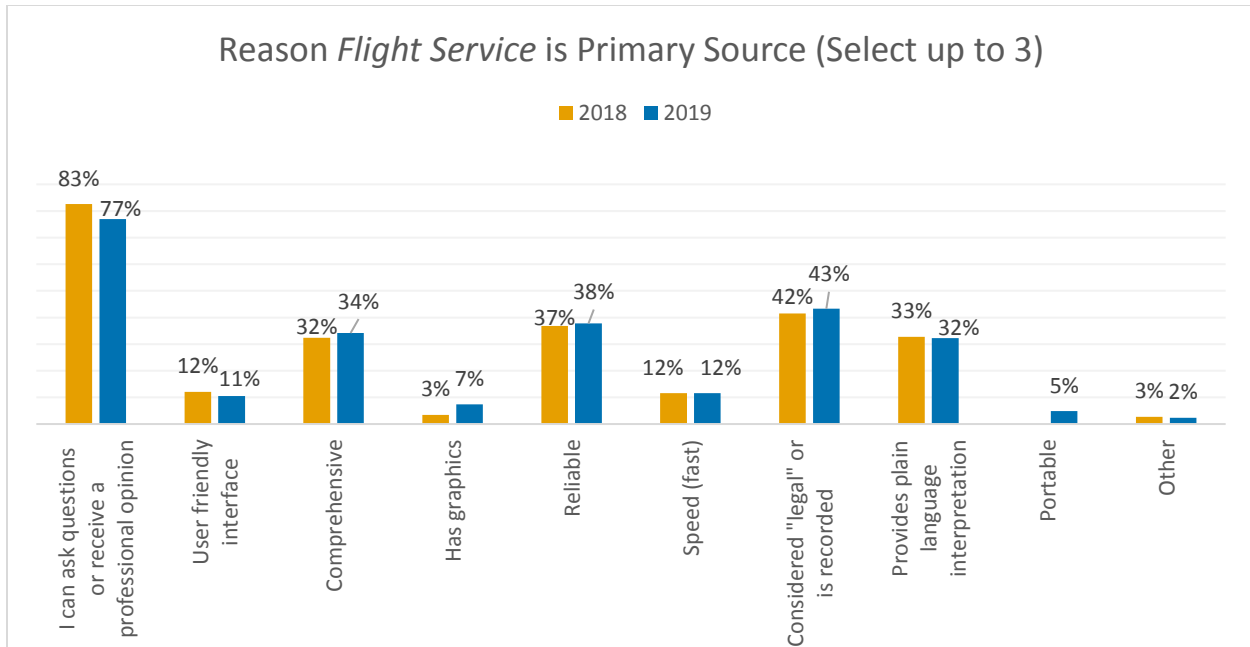


Figure 12. Close-up look at subjects’ reasons for selecting Flight Service ($n_{18} = 896$; $n_{19} = 559$) as their primary source, over time. Note that the response choice “portable” was added to the survey in 2018.

In 2018, most subjects who selected an aviation application as their primary source did so because of the source’s user-friendly interface (54% of CONUS and 67% of Alaska in 2018), but far fewer cited that reason this year (Figures 13 – 15). In 2019, just 38% of CONUS pilots (a decrease of 15%) and 53% of Alaskan pilots (a decrease of 14%) valued the user-friendly interfaces of aviation applications. Similarly, far fewer people valued the comprehensiveness of aviation applications in 2019; just 29% of CONUS pilots (a decrease of 11% from last year) and 24% of Alaskan pilots (a decrease of 21% from last year) preferred aviation applications for their comprehensiveness. On the contrary, more respondents reported using aviation applications for the graphics in 2019 than did in 2018; 64% of CONUS pilots (an increase of 12%) and 53% of Alaskan pilots (an increase of 25%) cited the graphics as a reason for using such apps. Portability was the second-most important aspect of aviation applications; about 51% of respondents (including – from Alaska and – from CONUS) used apps because of their portability. Notably, less than 1% of subjects who relied on aviation applications did so for the ability to ask questions or receive a professional opinion – whereas 77% of pilots who selected Flight Service found that feature important.

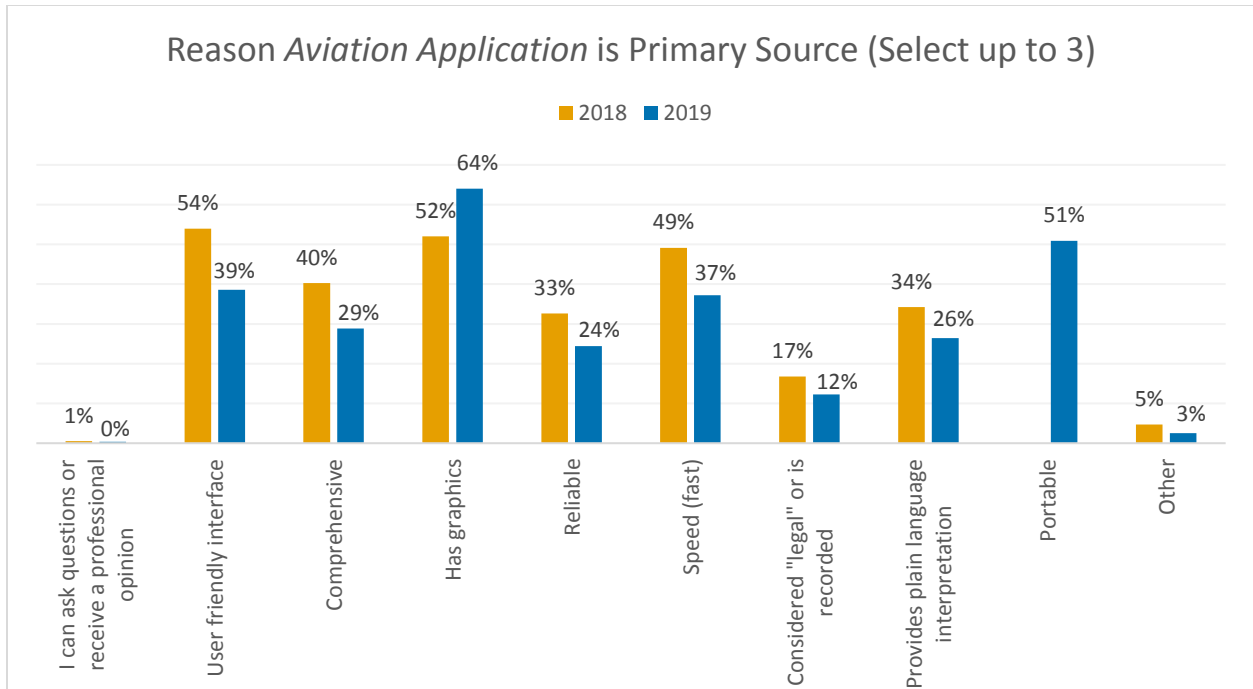


Figure 13. Close-up look at subjects’ reasons for selecting an aviation application ($n_{18} = 932$; $n_{19} = 839$) as their primary source, over time. Note that the response choice “portable” was added to the survey in 2018.

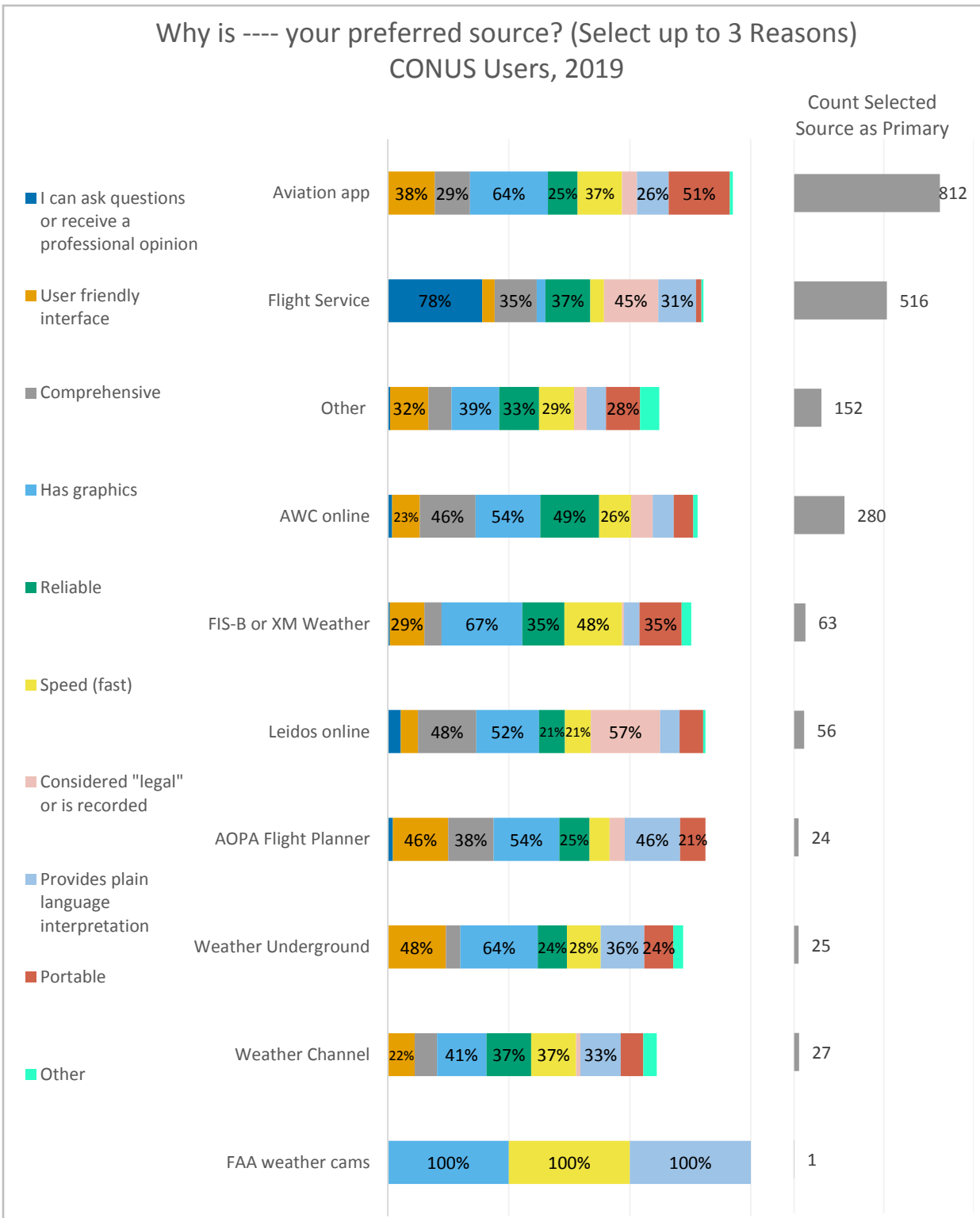


Figure 14. Reasons for choosing given preferred source, CONUS. Percentages reflect the number of people who chose each given reason, out of the total number of people who selected that source as their primary source. Subjects could select up to 3 reasons for their preference, so summed percentages may exceed 100 percent. 2019 data only.

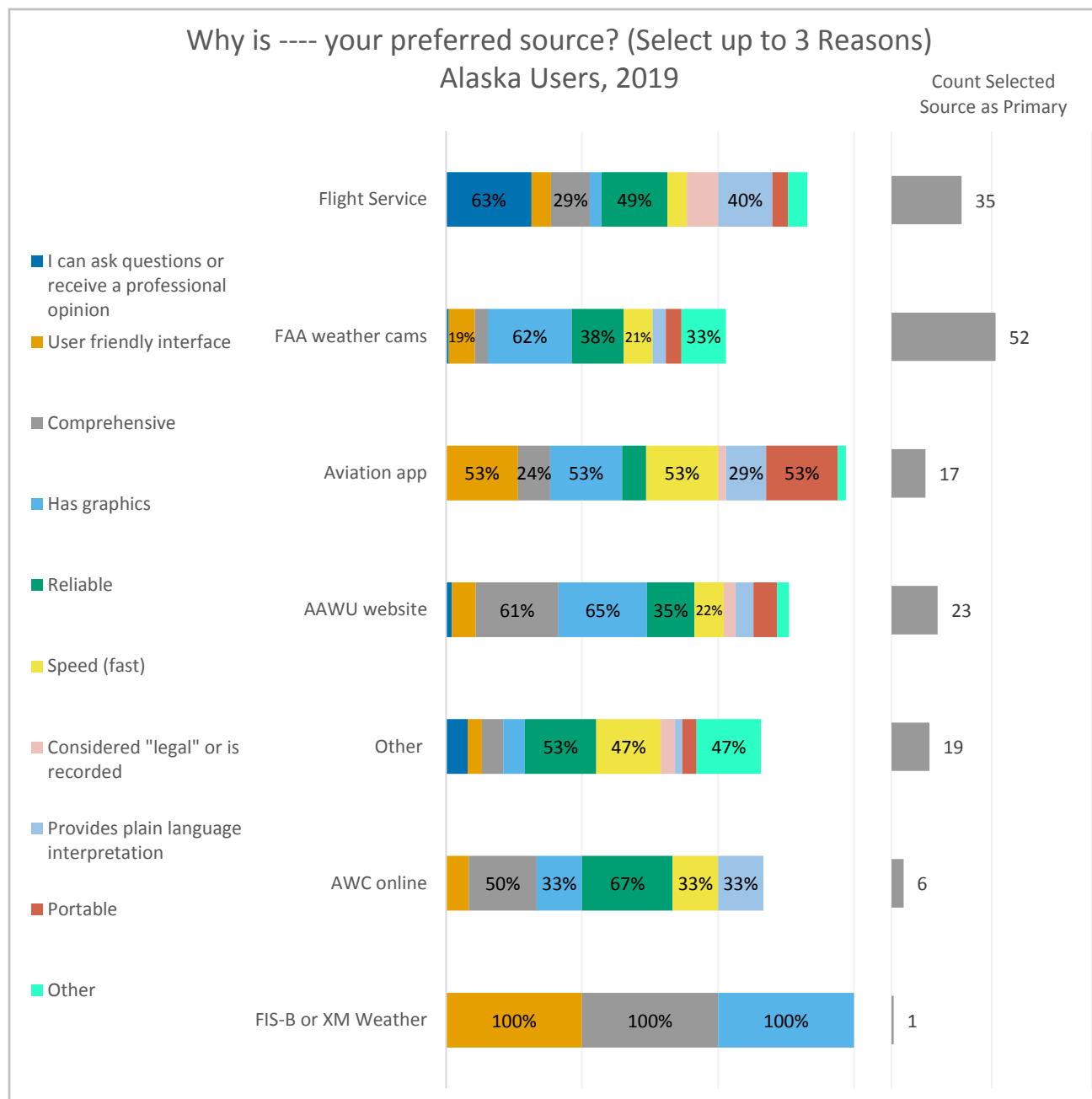


Figure 15. Reasons for choosing preferred source, Alaska. No subjects from Alaska selected Leidos online, Weather Channel, Weather Underground, or AOPA Flight Planner as their primary source. Subjects could select up to three reasons for their preference, so summed percentages may exceed 100 percent. 2019 data only.

FAA weather cameras. Use of FAA weather cameras has increased over time (Figure 6). The percentage of Alaskan pilots using FAA weather cameras as their primary source of information immediately prior to flight grew from 24% in 2017, to 34% in 2019 (Figure 16). Most Alaskan pilots reported preferring FAA weather cameras because of the graphics and reliability; the cameras help pilots visualize weather conditions and increase situational awareness. This feature is even valued at locations with a conventional automated weather station where the camera

serves as a validation tool to help spot unrepresentative METARs due to limits of the current sensors. Of the 47% of Alaskan pilots in 2018 and 33% of Alaskan pilots in 2019 who selected “other” reasons for that preference, most reported that the source allowed them to see actual conditions in real-time (“a picture is worth 1,000 words”).

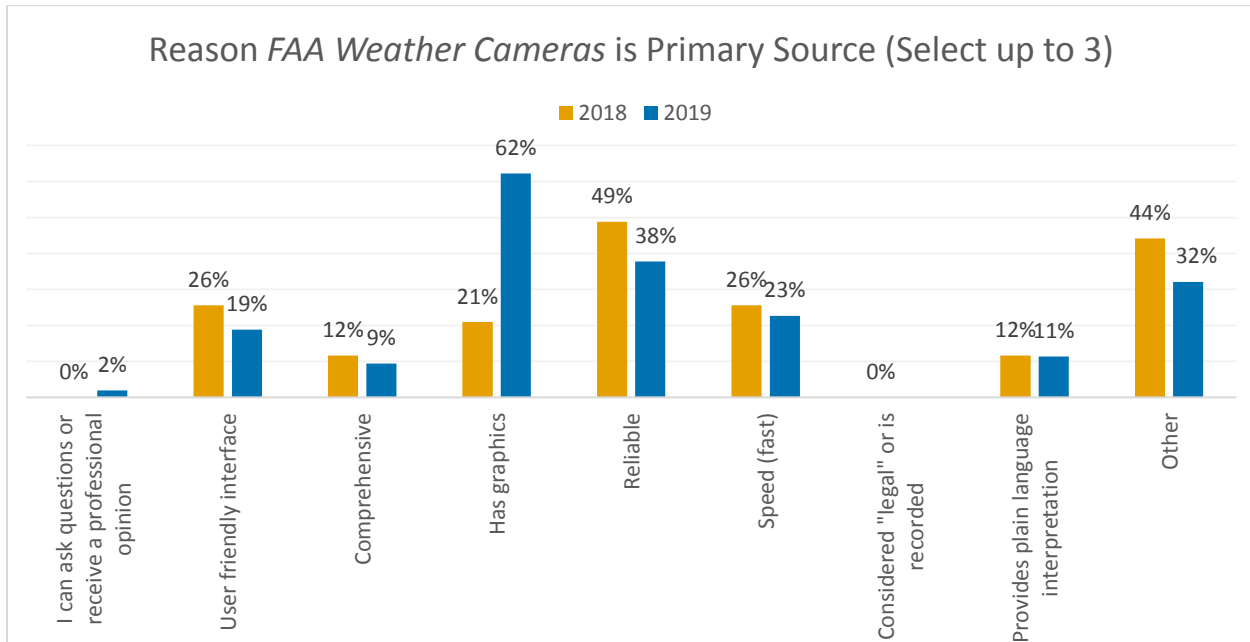


Figure 16. Reasons for choosing FAA weather cameras as preferred source (n₁₈ = 43; n₁₉ = 53). Only one respondent from CONUS chose FAA weather cameras as his/her primary source of weather information.

Alaska Aviation Weather Unit (AAWU). About three-quarters (79% in 2018; 75% in 2019) of Alaskan pilots always or frequently accessed AAWU prior to flying (Figure 17). In both 2018 and 2019, just 15% of Alaskan pilots reported that the AAWU website was their primary source of weather information immediately prior to flight under challenging conditions (Figure 6). Of those who said the AAWU was their primary source, 65% said this was because the site had graphics (an increase of 4% from last year); 61% said the site was comprehensive (an increase of 16% from last year); 35% said the site was reliable (a decrease of 10% from last year); and 17% said the site had a user-friendly interface (a substantial decrease of 21% from last year; see Figure 18 for more information). Reliability and satisfaction with the user interface both declined substantially following modifications of the website to become more “standardized” with other NWS weather websites.

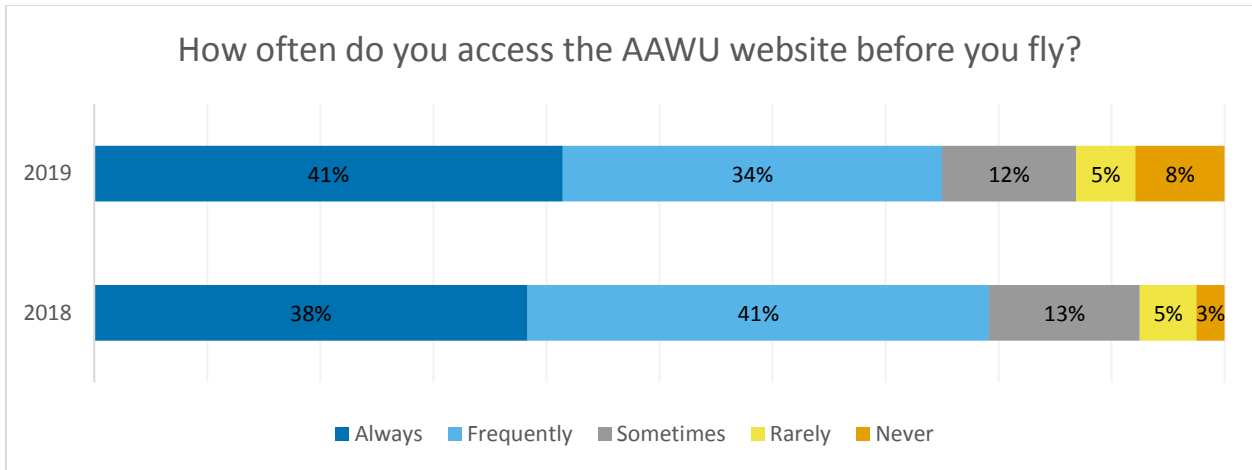


Figure 17. “How often do you access the AAWU website before you fly?” over time. Question was directed only towards Alaskan subjects (n₁₈ = 120; n₁₉ = 152)

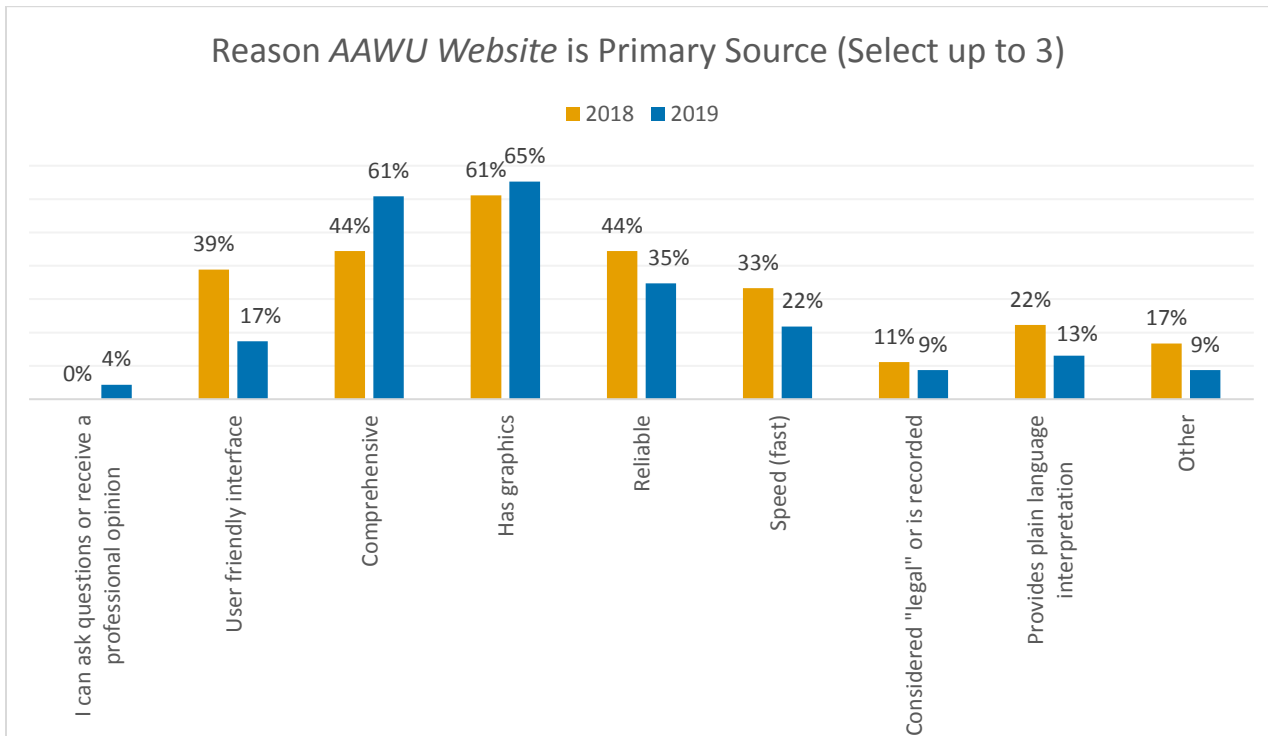


Figure 18. Reasons why the AAWU website is the primary source of weather information immediately prior to flight (n₁₈ = 18; n₁₉ = 23). No respondents from CONUS selected AAWU as their primary source of weather information.

Technology Used

EFB, FIS-B, and Sirius XM Aviation. Use of EFBs, FIS-B, and Sirius XM Aviation also differed by location and instrument rating or currency in both 2018 and 2019. In general, Electronic Flight Bags continue to increase in popularity relative to FIS-B and Sirius XM Aviation (Figure 19). This pattern held true in both 2018 and 2019, in both Alaska and CONUS. Instrument current pilots reported using all three forms of technology (EFBs, FIS-B, and/or Sirius XM Aviation) more frequently than other pilots in both 2018 and 2019, as well.

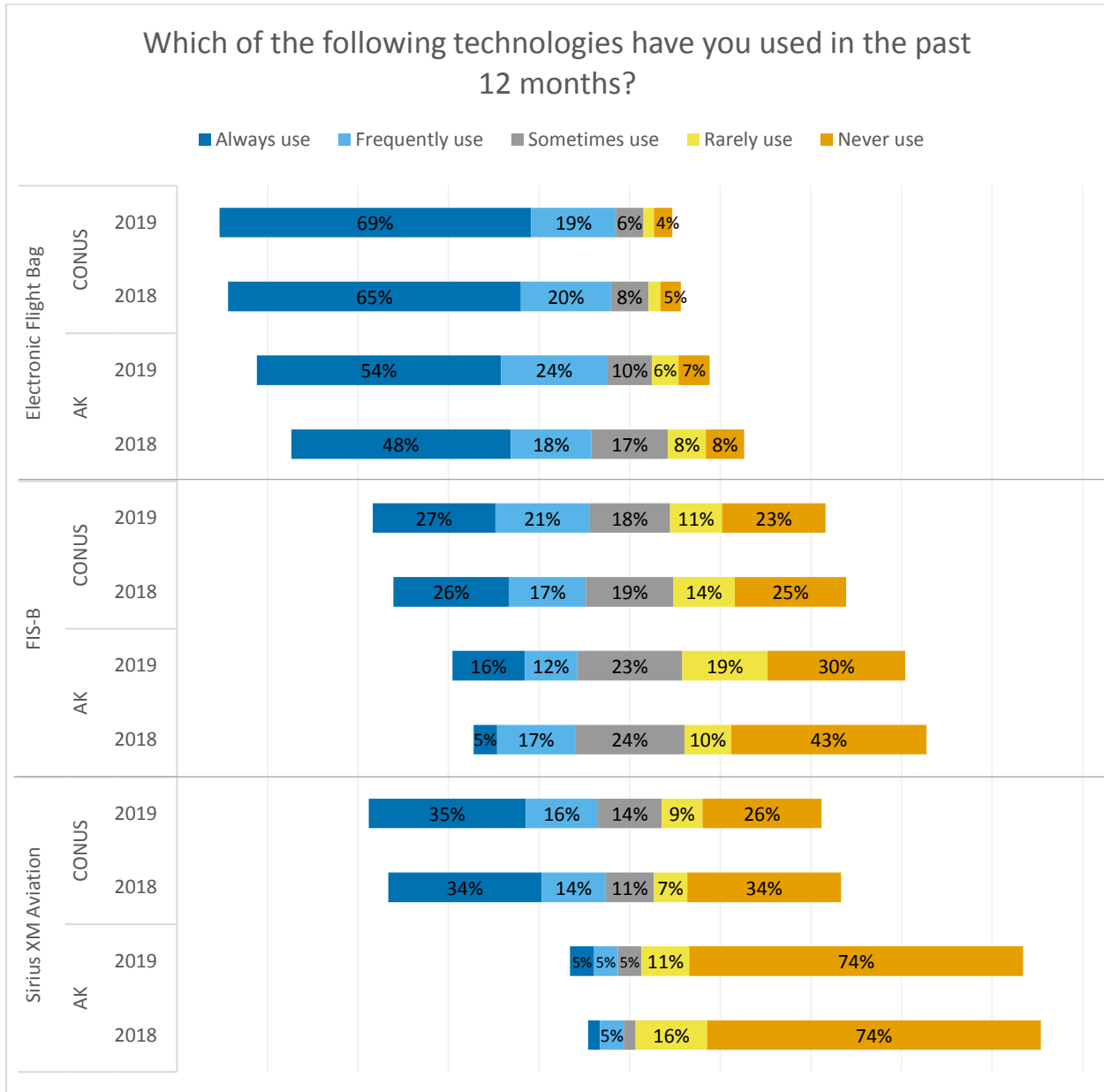


Figure 19. “Which of the following technologies have you used in the past 12 months?” by location and year. Adoption of Sirius XM Aviation is significantly lower in Alaska than in CONUS, likely due to a lack of coverage in the area.

Follow-up questions on use of FIS-B were posed to those who reported using FIS-B either frequently, or always. Pilots from CONUS were, overall, more often satisfied or extremely satisfied with the FAA’s FIS-B service than pilots from Alaska were (Figure 20), though this discrepancy was much less pronounced in 2019 than in previous years.

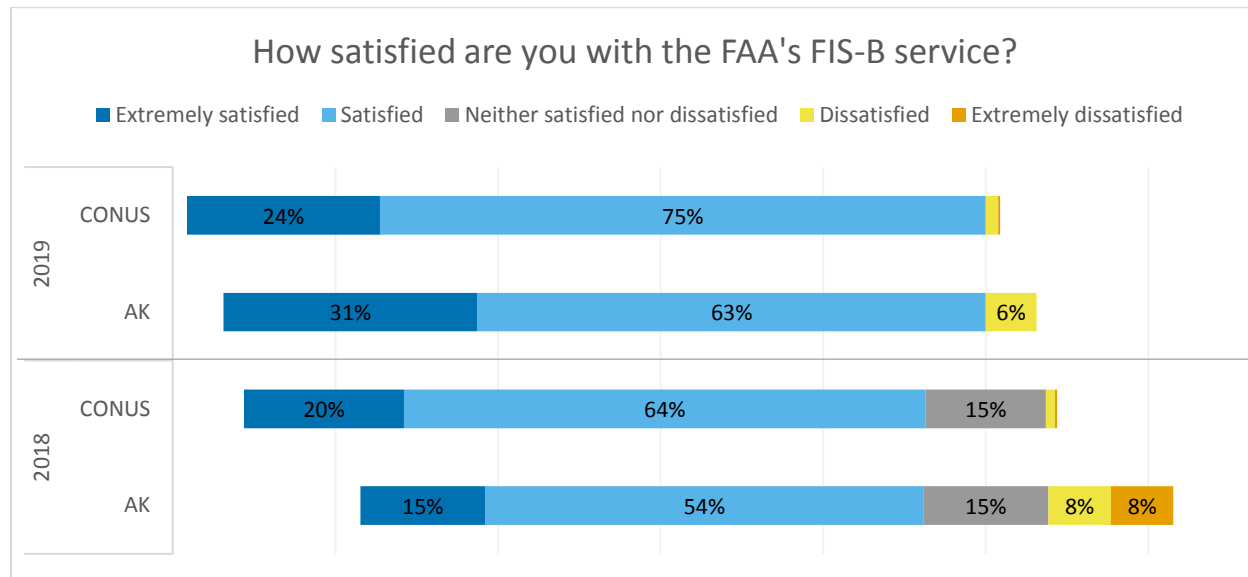


Figure 20. Responses to, “How satisfied are you with the FAA’s FIS-B service?”. Question only asked of those who used FIS-B at least “frequently.” In 2018, n = 13 for Alaska and n = 731 for CONUS. In 2019, n = 16 for AK and n = 455 for CONUS.

Pilot Reports (PIREPs). Alaskan pilots provided unsolicited PIREPs more often than CONUS pilots, in both 2018 and 2019 (Figure 21). Instrument rated pilots who were current were more likely to provide unsolicited PIREPs than other pilots were, in both years (Figure 22). Finally, ATP and commercial pilots provided unsolicited PIREPs more frequently than private pilots did, in both years (Figure 23). Still, most respondents (69%) had not provided a PIREP at all in the past year (as seen in Figure 24). Additional data is needed before concluding if there is a declining trend in unsolicited PIREPs; however, there is an indication that fewer pilots are providing these reports.

The readback requirement for PIREPs submitted over the radio in CONUS was removed in 2018, due to pilot complaints regarding the amount of time it took to submit a PIREP. Of the pilots who had submitted a PIREP in the last year, 84% reported that the change was effective in that it now takes less time to give a PIREP (Figure 24). The remaining 16% of pilots who submitted a PIREP within the past year said it still takes too long to submit a PIREP.

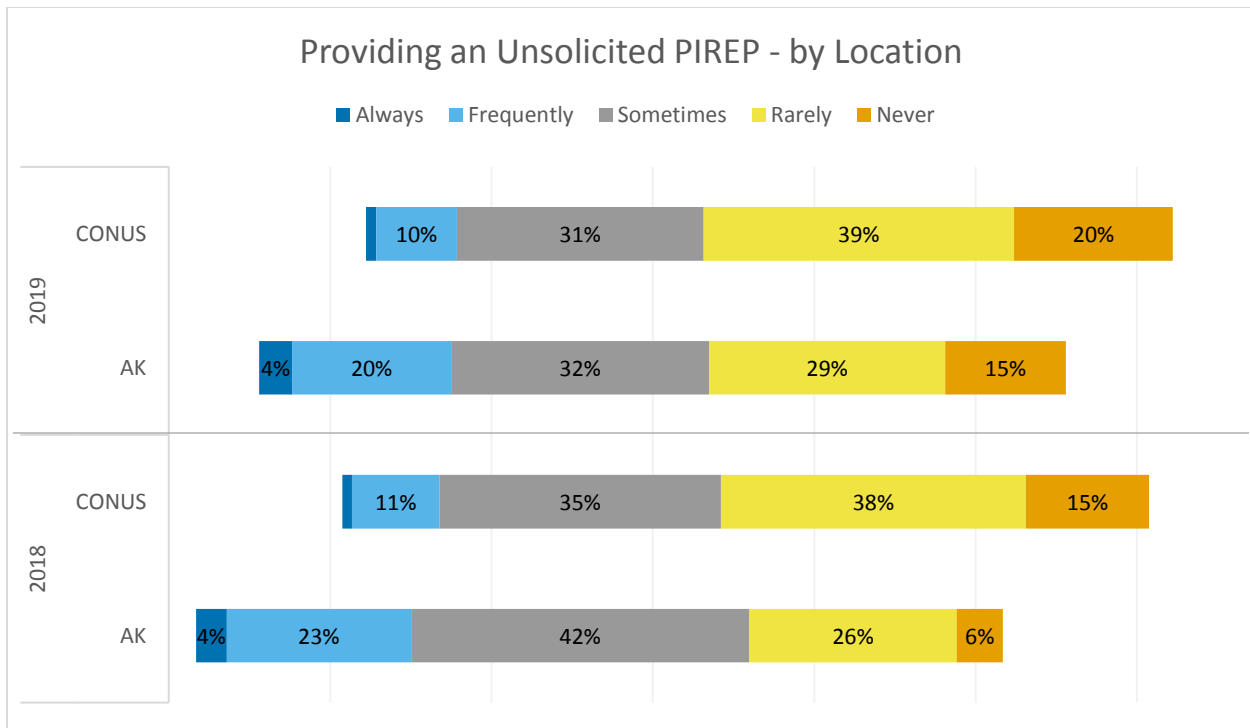


Figure 21. “How often do you usually provide an unsolicited PIREP?” broken down by location and year.

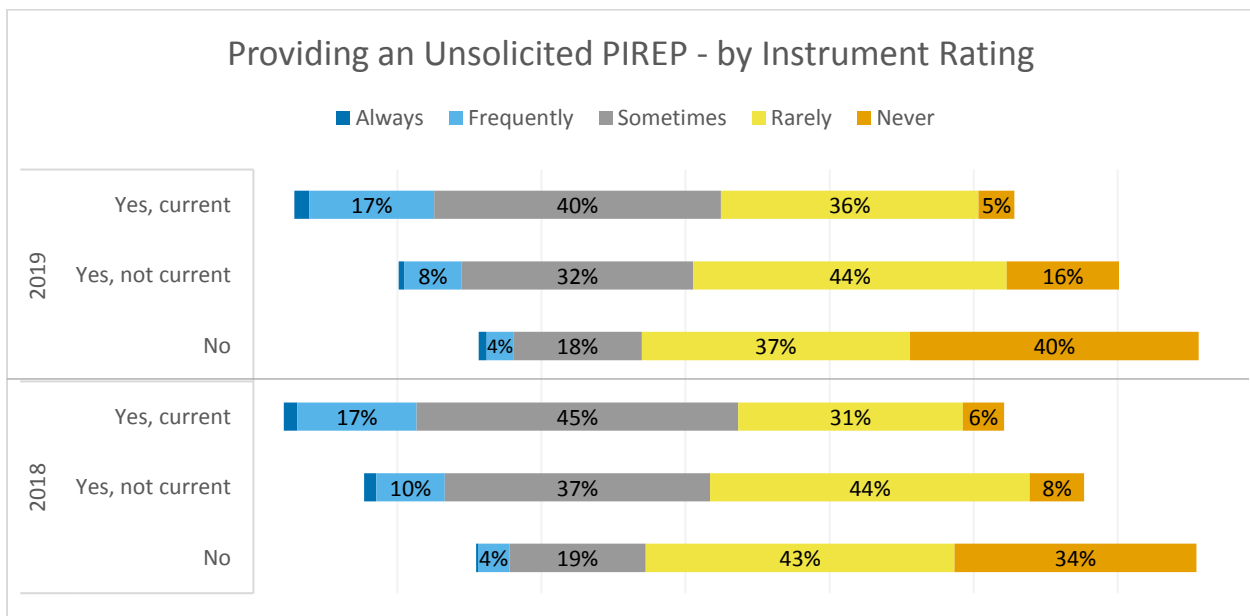


Figure 22. “How often do you usually provide an unsolicited PIREP?” broken down by instrument rating and year.

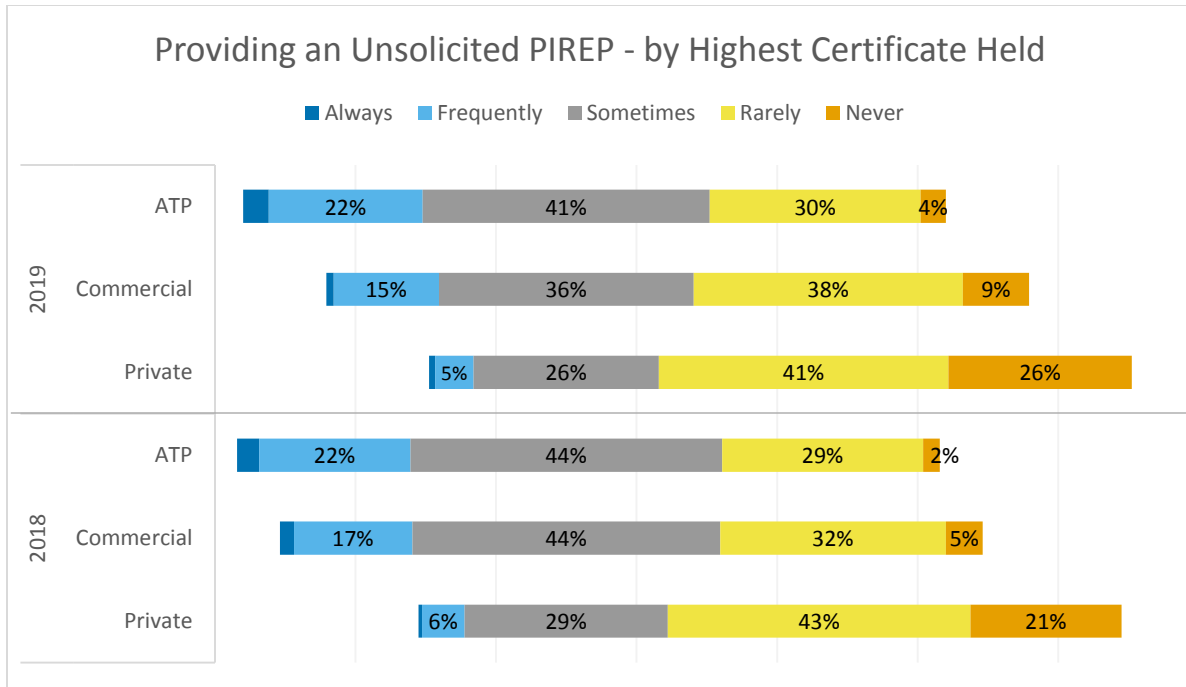


Figure 23. “How often do you usually provide an unsolicited PIREP?” broken down by highest certificate and year.

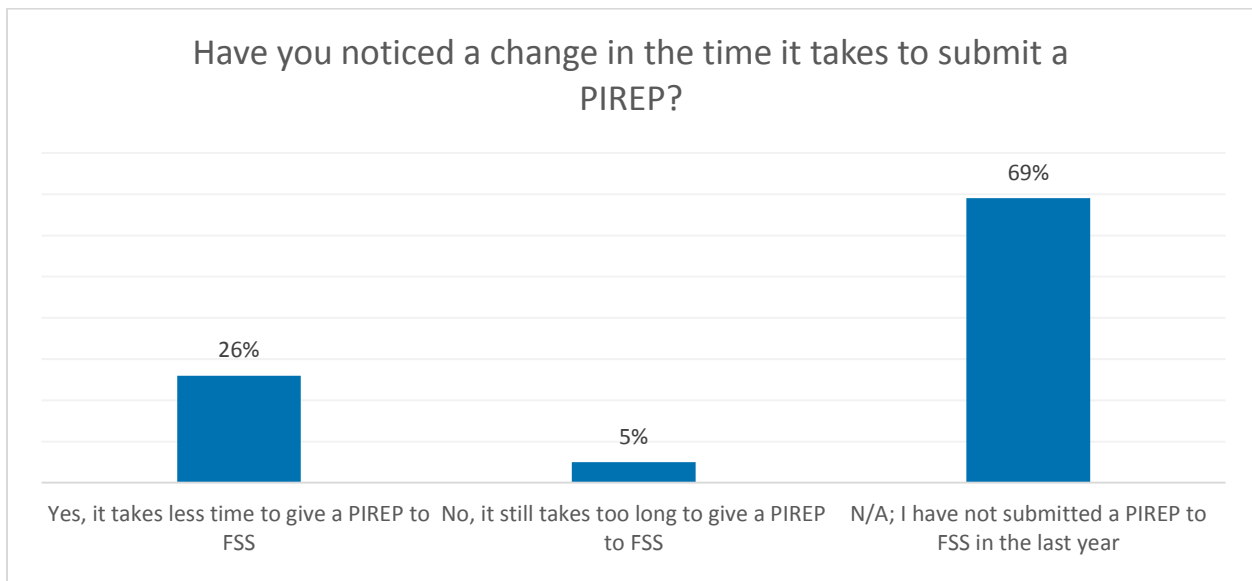


Figure 24. “In 2018 the readback requirement was removed for FSS when a PIREP is submitted over the radio by a pilot. This change was based on pilot complaints regarding the time it took to submit a PIREP. Have you noticed a change?” Asked in 2019 only. A total of 2,061 people responded to this question; 1,423 of those selected the “N/A” option. Percentages in the graph above are based on the total sample size, including those who selected the “N/A” option. The sample size excluding those who selected “N/A” is 638 people.

Retiring Legacy Weather Products

Winds Aloft. About 60% of respondents reported using the NWS’s Wind and Temperature Aloft Forecasts (FB) when flight planning at least sometimes (Figure 25); however, more than half of pilots (57%) did not believe that removal of the tool would impact their flying (Figure 26). Those who use the tool less often (i.e., sometimes, rarely, or never used when flight planning) were less likely to feel that they would be impacted by its removal (Figure 27). Private pilots and respondents between the ages of 45 to 74 were also less likely to be concerned about its removal.

Those who felt they *would* be impacted by its removal often discussed how they use the tool during flight planning. Many did not believe the same information (at the same level of detail) would be available in another similarly convenient, easy-to-use source. The following comments are examples of common concerns:

“I find the resolution on the graphics-based inadequate -- I fly within a 300 mile radius, so I don't need charts covering the entire country that don't allow me to zoom in on my region. Knowing the conditions at key airports provides a reliable way of extrapolating what I need to know.”

“The text table is fast/easy to use. A graphical table takes active manipulation (eg slider bar) to see all the winds at various altitudes and requires mental comparisons interpretation (ie u must remember what you saw previously and thus avails mistakes.”

Pilots from Alaska and Hawaii, though no more or less likely to feel they would be impacted by the removal of the tool, had specific concerns about the information available to them in graphical format. For example:

“In Hawaii, textual winds aloft is published for altitudes lower than 3000 AGL. The graphic form does not provide data below 3000 AGL. Also, an exact number is much more precise than counting barbs. With orthographic turbulence, a significant problem in Hawaii, a few knots can make a large difference. In Hawaii the reporting points are just as far apart for both forms. A textual table just is quicker to read also, and can be quickly written down. Graphics are nice, but they don't substitute for textual data. So bottom line, getting the information I depend on would be harder, and less precise. The winds aloft are about 80% of the go-no go decision for me.”

“I just tried to access the winds aloft information for Alaska via the graphic link, and got nothing. Graphic products can sometimes be unstable, whereas the text is reliable. The Alaskan region also often does not have the same "attention" given to it as the contiguous US (i.e. graphical weather products are often sketchy or useless), and we often rely on older products.”

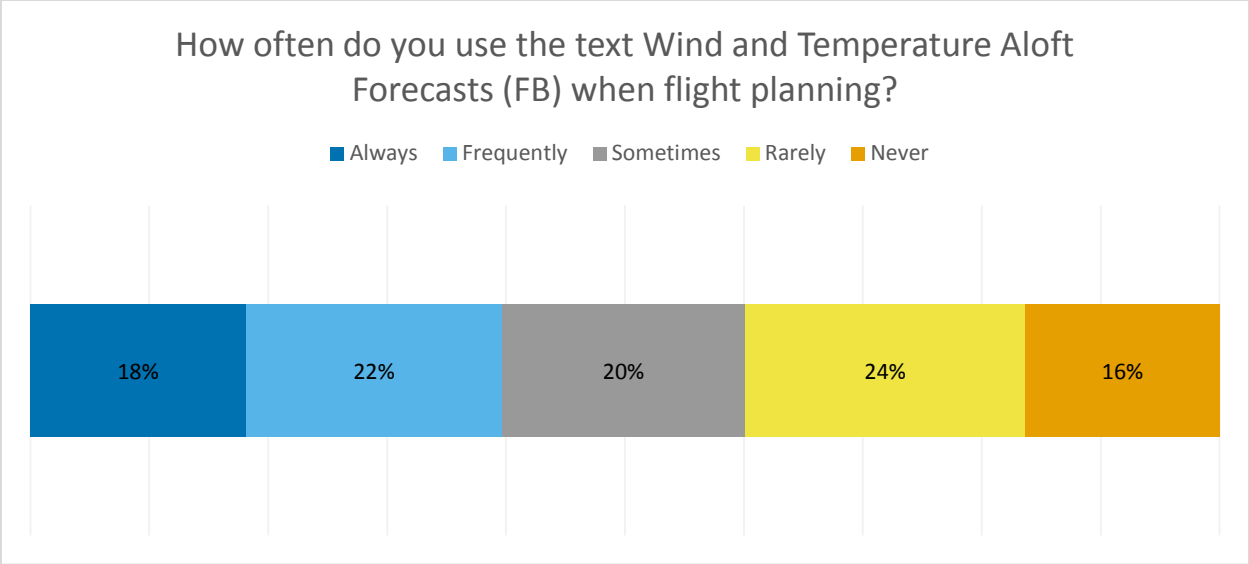


Figure 25. “How often do you use the text Wind and Temperature Aloft Forecasts (FB) when flight planning?” Asked in 2019 only (n = 2050).

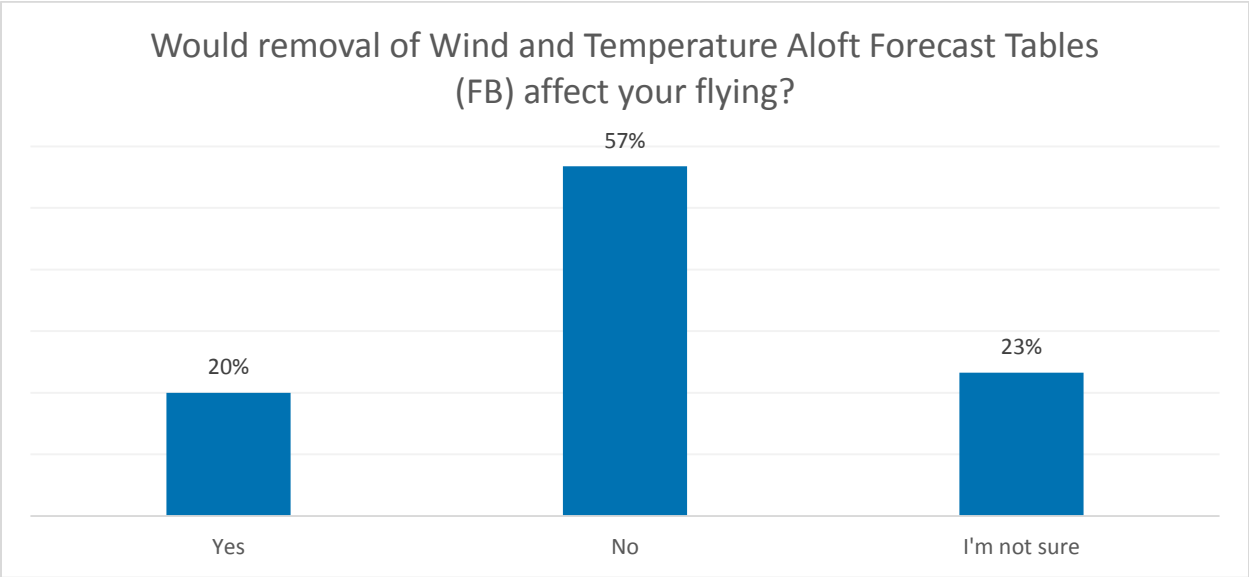


Figure 26. “If the National Weather Service stopped producing the text Wind and Temperature Aloft Forecast Tables (FB), would it affect your flying? Wind information would remain available in graphic form at places such as <https://aviationweather.gov/gfa> or automatically incorporated into flight planning software such as ForeFlight.” Asked in 2019 only (n = 2055).

Would removal of FB Winds impact your flying, by frequency of use
 2019 data only. Percentages are by how frequently respondents used the tool

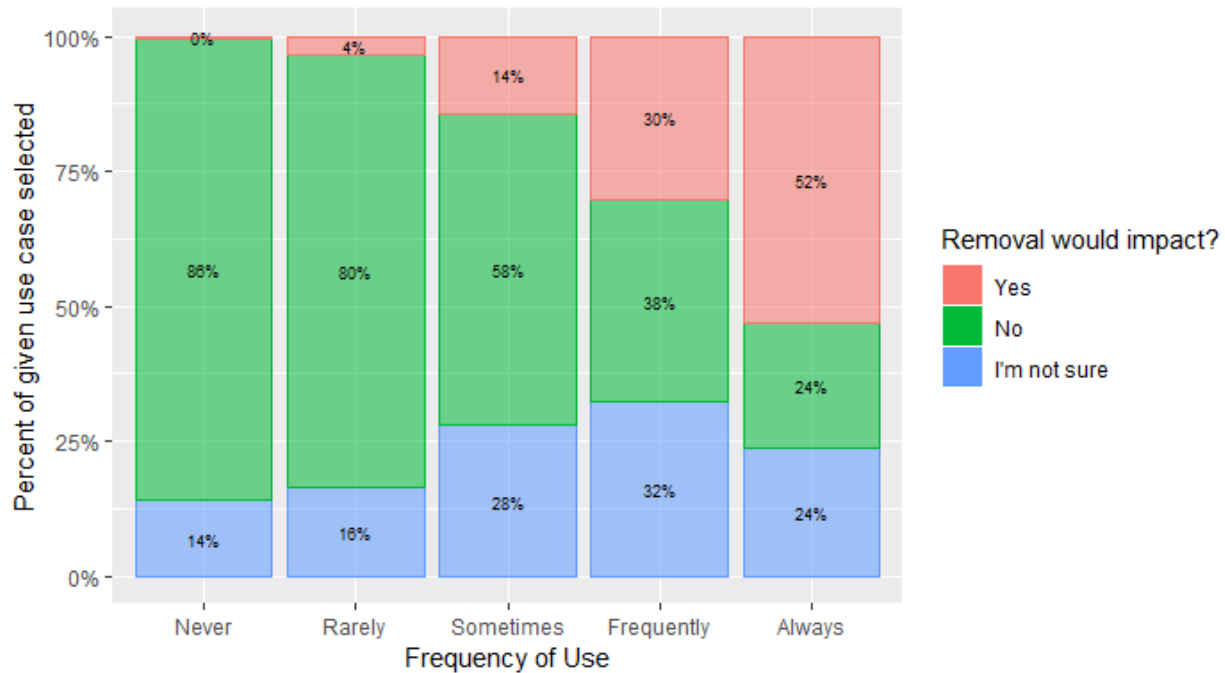


Figure 27. “If the National Weather Service stopped producing the text Wind and Temperature Aloft Forecast Tables (FB), would it affect your flying?” by how often respondents used the tool when flight planning (“How often do you use the text Wind and Temperature Aloft Forecasts (FB) when flight planning?”). n = 2050

Weather Depiction Charts. More than half of respondents (63%) rarely or never used the NWS’s Weather Depiction Chart when flight planning (Figure 28). Almost three-quarters (74%) of respondents did not feel that removal of the tool would impact their flying (Figure 29). Younger respondents (especially those under 35 years old), student pilots, and those who used the tool more often (frequently or always) were more likely to feel that the removal of the Weather Depiction Charts would impact them. Those who did feel that they would be impacted by the tool’s removal said they used the tool for flight planning, especially for long-distance and cross-country flights. Respondents also said the tool provides a good overview of broad trends, is quick and easy to use, and acts as a good redundancy. Examples of comments include:

“The Wx Depiction Chart is a good reference for what is going on right now. It is a great quick visual reference for VFR and IFR weather info. A valuable quick reference for use immediately before a flight. It’s also a good cross reference for other weather data.”

“I am comfortable using the old style weather depiction chart. Moving to the new data presentation would require retraining and study on my part to understand what I am seeing.”

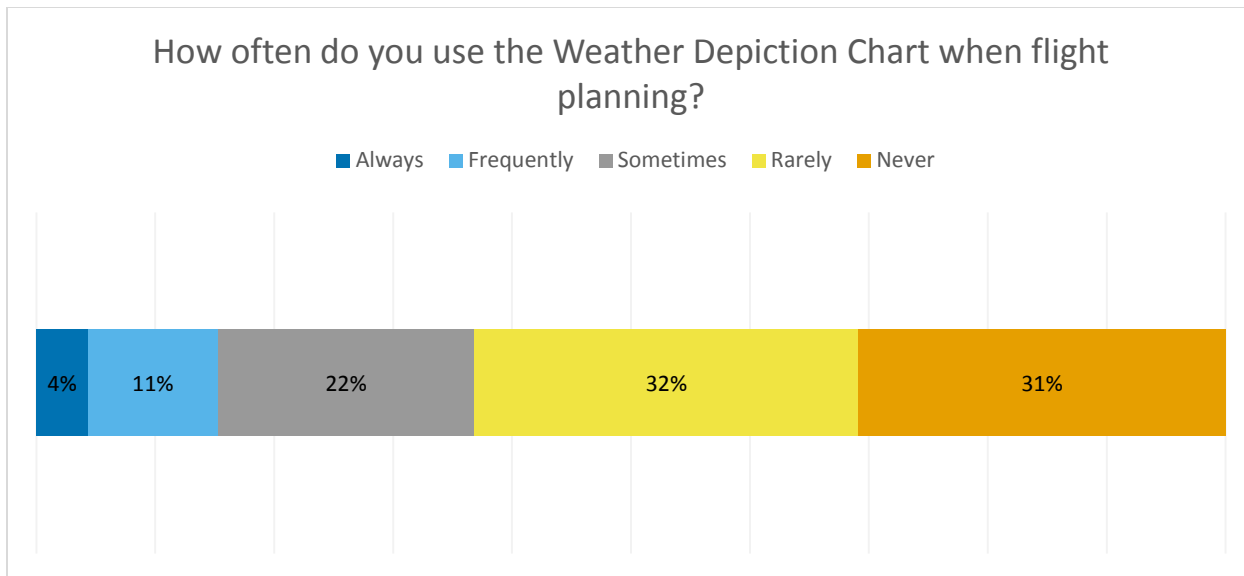


Figure 28. “How often do you use the Weather Depiction Chart when flight planning?” Asked in 2019 only (n = 2019).

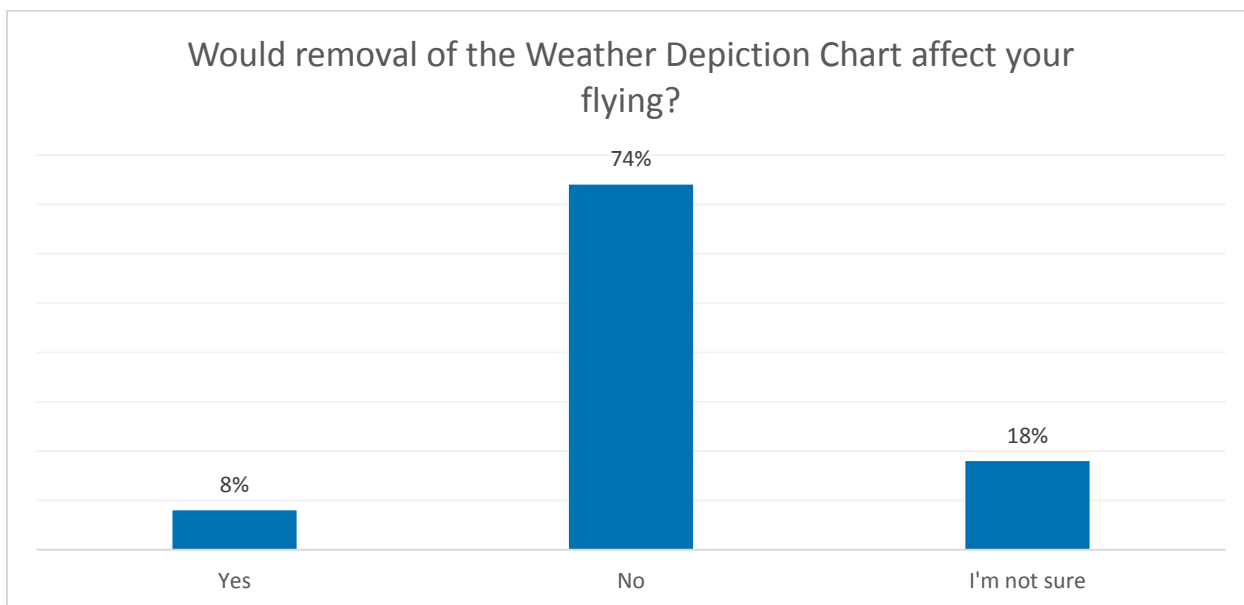


Figure 29. “If the National Weather Service stopped producing the Weather Depiction Chart, would it affect your flying? All weather information would remain available in graphical form.” Asked in 2019 only (n = 2016).

Text and Graphical AIRMETS. About half of respondents (53%) rarely or never use text AIRMETS in place of the graphical AIRMETS (G-AIRMETS) when flight planning (Figure 30). ATP and commercial pilots used text AIRMETS instead of graphical ones when flight planning more often than private pilots did.

Over half of respondents (59%) preferred the G-AIRMET over the text AIRMET (Figure 31). Pilots in the Continental United States were more likely to prefer the G-AIRMET over the text

version than pilots in Alaska or Hawaii (Figure 32). Current, instrument rated pilots also tended to prefer the G-AIRMET more than other pilots did.

About 70% of respondents did not believe that removal of the text AIRMET would impact their flying (Figure 33). Pilots from Alaska and Hawaii more often said they would be impacted by removal of the text AIRMETS than pilots from CONUS. Private pilots (especially those without an instrument rating) were among the least likely to feel they would be impacted by the removal of text AIRMETS. Those who were concerned that the removal of the text AIRMET would affect them primarily discussed how frequently they use the resource for pre-flight planning activities. These respondents often mentioned how easy the tool was to use, and how they were unsure if the same level of detail would be available in other products.

Pilots from Alaska and Hawaii had specific concerns about how much information would be available if text AIRMETS were eliminated. For example, some of these pilots said:

“This is the primary source (and only known source in Alaska) to check airmets. Removing textual airmets would eliminate airmet knowledge in its entirety. This would be extremely foolish.”

“It would make it take more time for me to get a quick comprehensive weather report. Airmets in Hawaii are generally simple (either there is turbulence downwind of mountains all islands or there is not). This information can be read in one sentence as quickly as looking at a map....”

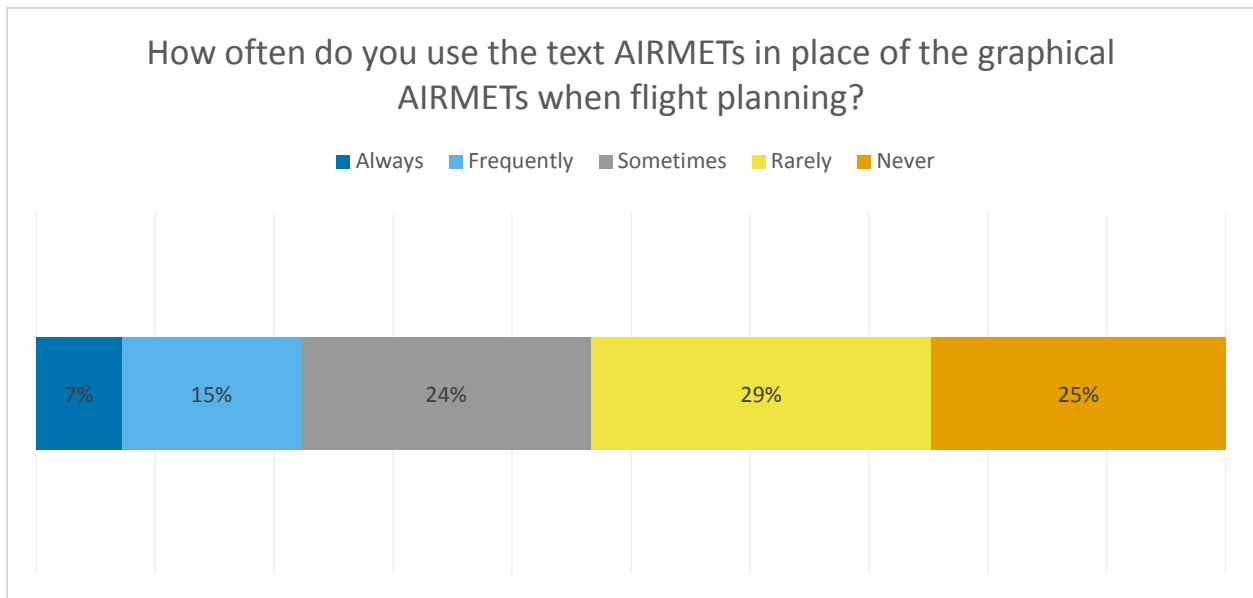


Figure 30. “How often do you use the text AIRMETS in place of the graphical AIRMETS when flight planning?” Asked in 2019 only (n = 1964).

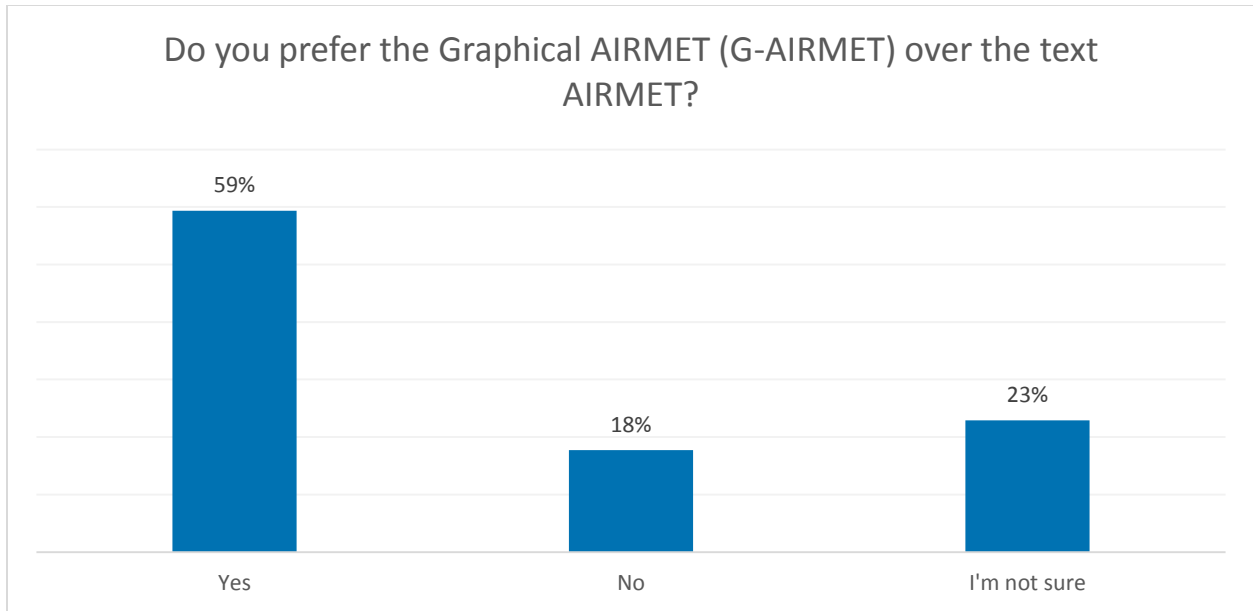


Figure 31. “Do you prefer the Graphical AIRMET (G-AIRMET) over the text AIRMET?” Asked in 2019 only (n = 1964).

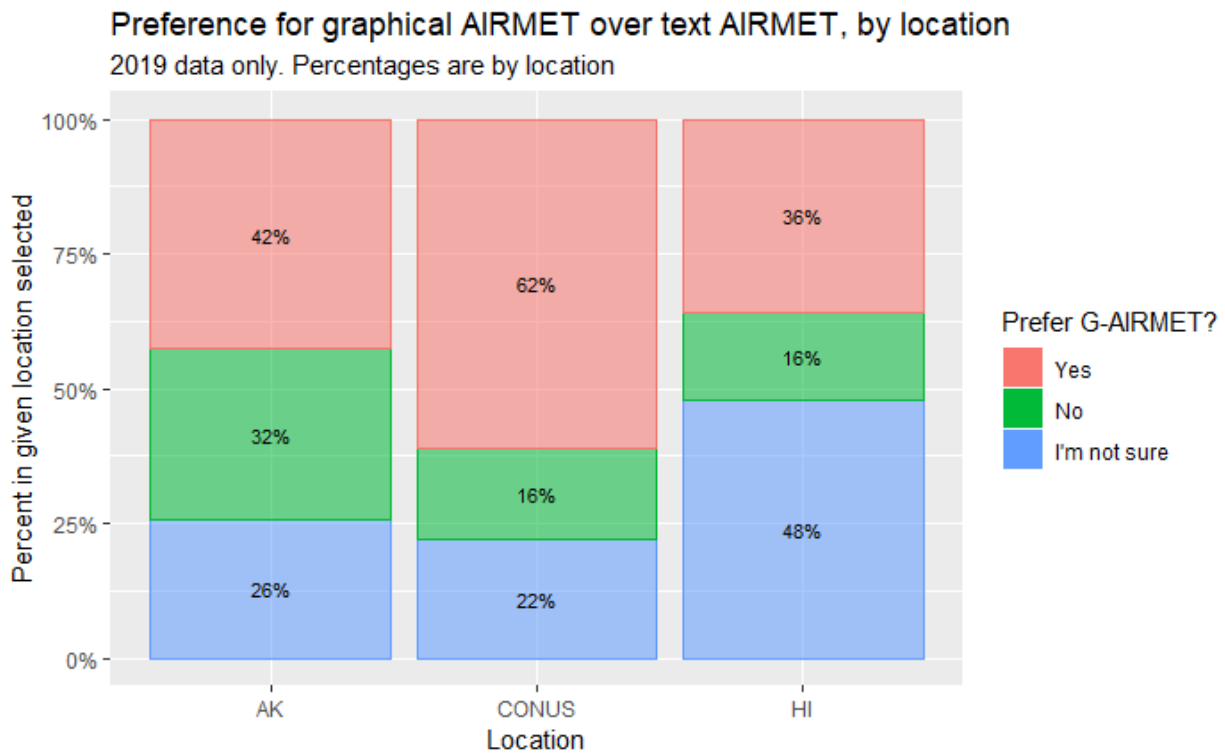


Figure 32. Results for “Do you prefer the Graphical AIRMET (G-AIRMET) over the text AIRMET?” by location (n = 1959). Note, only 25 respondents were from Hawaii.

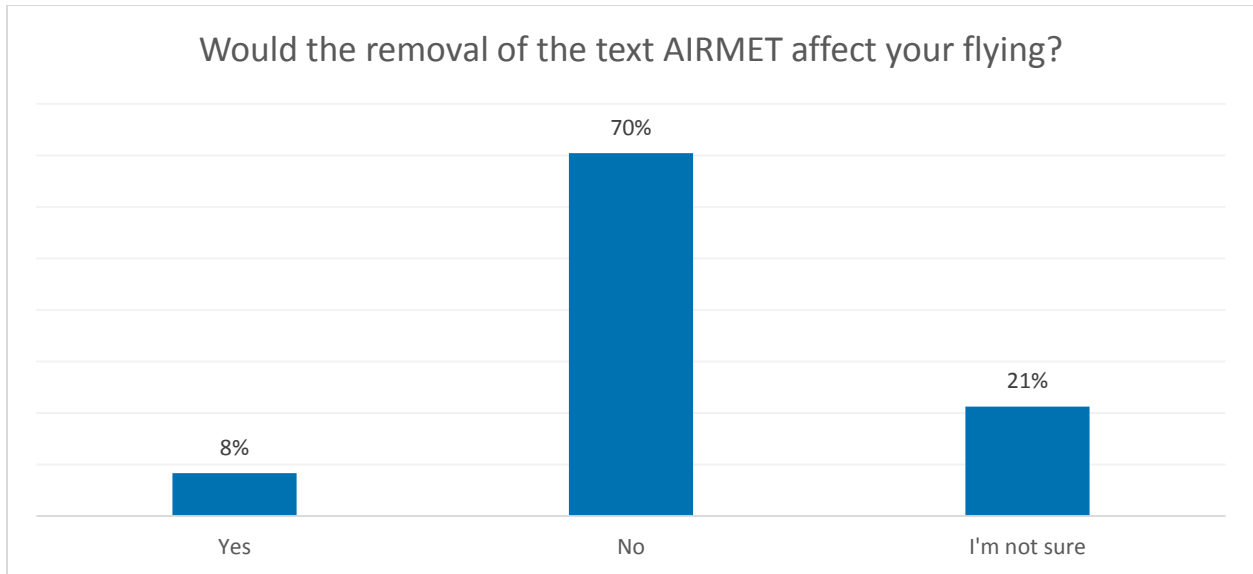


Figure 33. “If the National Weather Service stopped producing the text AIRMET, would it affect your flying? All weather information would remain available in the G-AIRMET, including a textual description.” Asked in 2019 only (n = 1969).

NWS’s Watch, Warning, and Advisories. About 42% of pilots rarely or never check the NWS’s Watch, Warning, and Advisories when flight planning (Figure 34). Almost half (48%) of respondents believed that the Watch, Warning, and Advisories were relevant to their flying (Figure 35), and even more (62%) felt they were easy to use and understand (Figure 36). ATPs and current instrument rated pilots tended to feel that Watch, Warning and Advisories were relevant to their flying, easy to use, and easy to understand more than other cohorts did. Younger respondents (especially those under age 35) more often agreed that the Watch, Warning, and Advisories were relevant to their flying, but respondents between the ages of 35 to 54 were more likely to agree that the Watch, Warning, and Advisories were easy to use and understand. About half (51%) of those who did *not* check the Watch, Warning, and Advisories when flight planning said they use an alternative resource to get the same information. About one-quarter (23%) of respondents commented that they were not familiar with the Watch, Warning, and Advisories, and about one-quarter (23%) commented that they did not need to use the resource since they would not fly in such conditions. About 3% of respondents said the service is not easy to use, and 3% said it was not a good source of information.

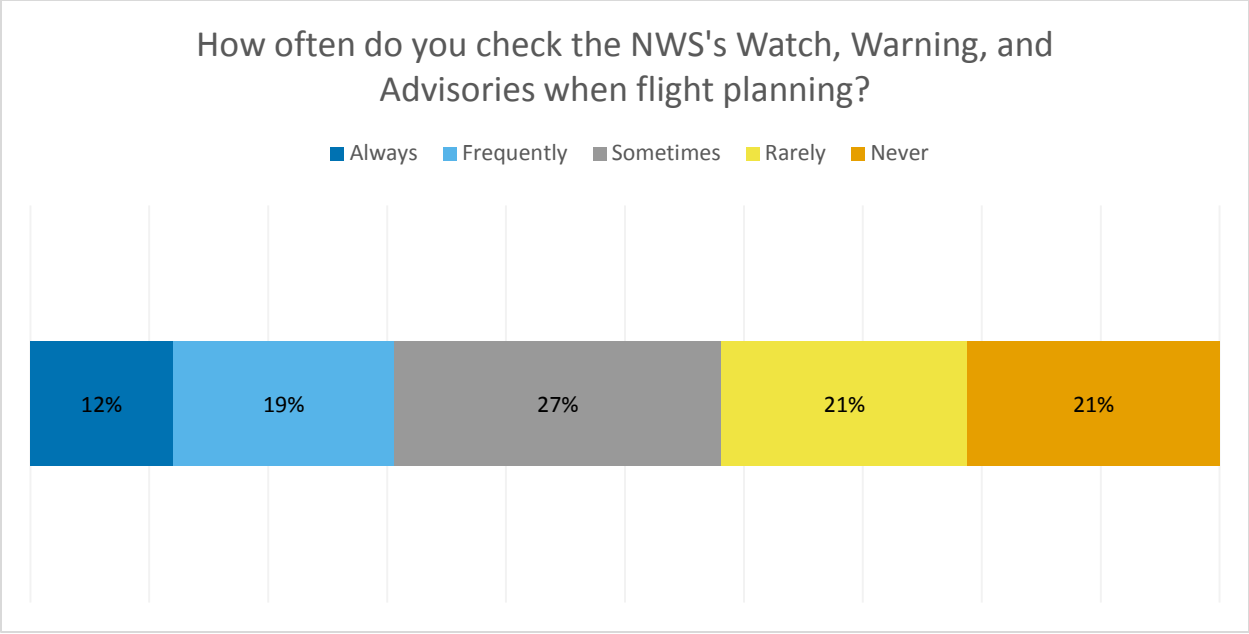


Figure 34. “When flight planning, how often do you check the NWS’s Watch, Warning, and Advisories?” Asked in 2019 only (n = 1943).

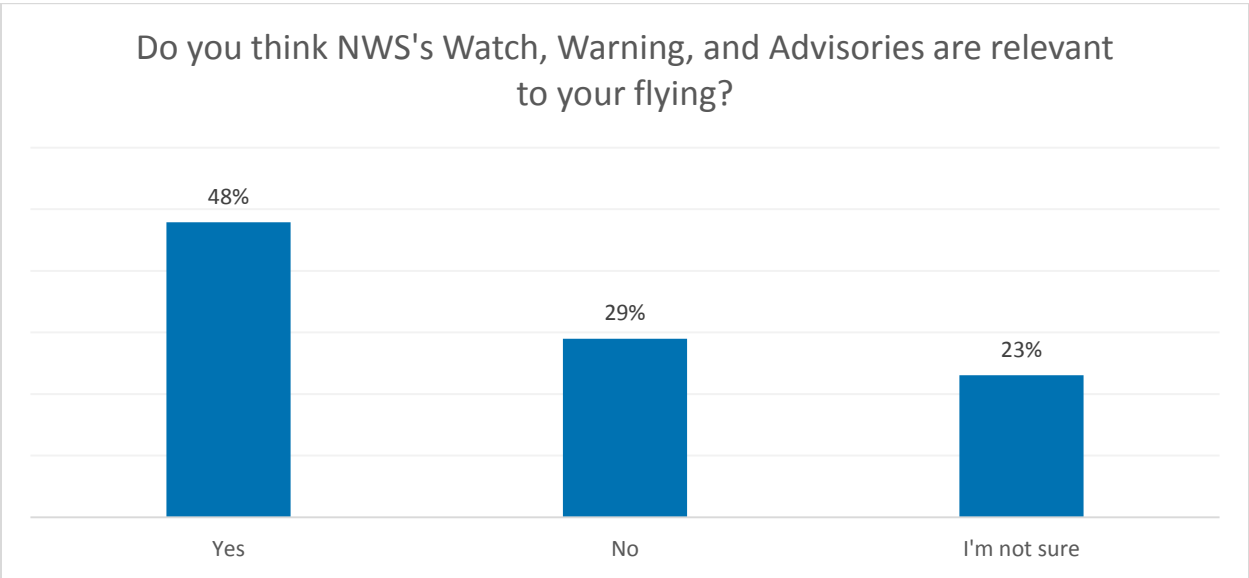


Figure 35. “Do you think the NWS’s Watch, Warning, and Advisories are relevant to your flying?” Asked in 2019 only (n = 1941).

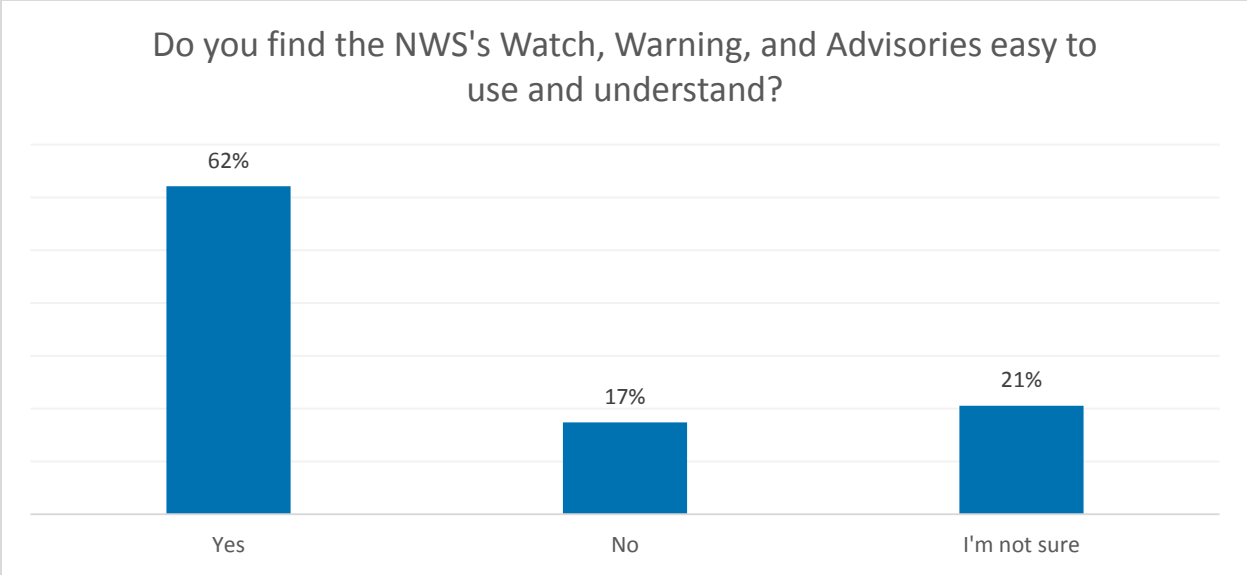


Figure 36. “Do you find the NWS’s Watch, Warning, and Advisories easy to use and understand?” Asked in 2019 only (n = 1124).

Discussion

The present survey acted as a follow-up to the results of AOPA’s 2017 and 2018 weather surveys. The survey’s goal was to better understand how general aviation pilots access weather information. We evaluated trends in which resources are used and how often, in addition to asking new questions about potentially retiring legacy weather products.

Flight Service Utilization

Year over year we are seeing declining utilization of Flight Service by pilots in CONUS and Alaska. The biggest drops have been seen in Alaska where utilization of Flight Service for initial weather briefings has decreased from 64% in 2017, to 49% in 2018, and now 45% in 2019. We also see just 23% of Alaskan pilots listed Flight Service as their primary source for weather immediately prior to flight – a decrease of 11% from 2018. The significant drop and the clear declining trend indicates the need for a comprehensive look at what services are provided by Alaskan Flight Service and what changes are needed for this group to remain relevant and utilized by their general aviation customers. Pilots value the service and consistently indicate it is an important safety resource when a question comes up regarding weather for a given flight. Flight Service specialists should remain available and accessible, during preflight and inflight, for general aviation pilots as they are a primary resource when it comes to weather understanding.

FAA Weather Cameras

The percentage of Alaskan pilots using FAA weather cameras as their primary source of information immediately prior to flight grew from 24% in 2017, to 34% in 2019. This FAA product has also been consistently the most popular source for weather information when conducting an initial weather briefing during pre-flight planning. The increasing popularity of this technology for weather information among pilots indicates the FAA should take seriously the request from Alaskan users for more systems. As we have detailed in previous survey reports, we believe more investment in this technology and additional locations are desired, including expansion of the program beyond Alaska.

Increasing Use of FIS-B

As more pilots embrace technology in the cockpit and equip with ADS-B ahead of the 2020 mandate, we are seeing larger number of pilots using EFBs, like iPads, and the use of free weather and aeronautical information in the cockpit via FIS-B. Utilization of FIS-B always, frequently, or sometimes increased in CONUS from 62% in 2018 to 66% in 2019. The numbers also increased in Alaska from 46% to 51%, but notable the number of pilots always using FIS-B in Alaska increased by 11%. Satisfaction with the service also increased from 84% of pilots indicating extremely satisfied or satisfied to 99%. Alaskan user satisfaction also increased but overall remains lower than CONUS likely due to well-known coverage gaps. It would likely increase Alaskan user satisfaction in the FIS-B service if the FAA were to exploit opportunities for improving the range of coverage in the state.

PIREPs

There was not a significant difference between the 2018 survey results and this year's when looking at the disposition for pilots to submit a PIREP. If anything, there is an indication of a decrease in unsolicited PIREP submission by pilots and yet we know from previous surveys that PIREPs are highly valued weather information. We are encouraged by the initial results of an FAA initiative to improve PIREP solicitation and submission. In a review of a single Flight Service policy change related to readbacks, 84% of pilots who submit PIREPs reported that the change was effective in that it now takes less time to give a PIREP. The success of this small change will be measured in the number of PIREPs filed over time, but the high percentage of pilots who approve of this modification is indicative of there being opportunities to improve the PIREP system for pilots.

Retiring Legacy Weather Products

As a participant in the FAA and NWS Weather Information Modernization and Transition (WIMAT) effort, we have been reviewing proposals to retire legacy weather products that may no longer serve a purpose. This is an important initiative as the aviation industry works to create improved modern weather products. In support of that effort, we surveyed our members on use and value of the Wind and Temperature Aloft Forecasts, Weather Depiction Chart, and the

textual AIRMET. About 60% of pilots do use the Wind and Temperature Aloft Forecast product at least sometimes, which indicates a need to further scrutinize this product before retiring it. On the other hand, the Weather Depiction Chart is not a popular product and most pilots indicated its removal would not have a negative impact on their flying. Likewise, the textual AIRMET is not used by most pilots and the G-AIRMET was preferred. In all cases, the removal of any Alaskan or Hawaiian weather product would need additional research given those regions have different limitations than CONUS.

Utilization of NWS Watch, Warning, and Advisories

The NWS is engaged in a Hazard Simplification Project which includes reviewing the existing Watch, Warning, and Advisories they produce for opportunities to improve the product for the many diverse customers that rely on that information. Aviators are trained on numerous weather products that are similar, including SIGMETs and AIRMETs; however, pilots generally do not get training or testing on NWS Watch, Warning, and Advisories. The majority of pilots indicated they find these weather resources relevant to their flying and they do at least sometimes reference this information. Continuously improving the utility of these products, improving user guidance, and increasing advertisements for these products in FAA materials could increase utilization and maximize awareness of weather conditions along chosen air routes. Maximizing awareness of weather conditions improves pilot safety. Pilots with better information about weather are less likely to make errors that impact safety like VFR flight into IMC often blamed for accidents.

Recommendations

Based on the results from this survey, and subsequent meetings and discussions with stakeholders, the following recommendations are made.

- 1) The FAA should increase their efforts to modernize Alaska Flight Service to ensure that resources meet evolving pilot requirements and is accessible in those safety critical times pilots need additional expertise.
- 2) The FAA should maintain and monitor weather cameras in a manner consistent with their operationally significant purpose to ensure their observations are available for pilots.
- 3) The FAA should pursue modification to the Alaska FIS-B system to improve the look-ahead range and to remove unnecessary limitations that are not needed in the state because of fewer bandwidth concerns than in other parts of the country. While not relaxing the need for additional ground stations to fill major gaps in coverage, this change would provide data for pilots regarding conditions ahead on longer cross-country flights.
- 4) The FAA should continue to work with users to identify the barriers to PIREP submission and implement common sense changes to improve the service.

- 5) The NWS should include general aviation stakeholders in the Hazard Simplification Project to get specific feedback to improve the products for pilot use and to further explore ways of integrating this information into the AWC and AAWU websites.

Survey Limitations

There are several important limitations to note when interpreting results from this survey. First, sample size and margin of error must be considered. Small sample sizes and correspondingly large margins of error for Alaskan pilots leads to more uncertainty in results for those populations. The margin of error will also be notably higher (and thus, estimates will be less reliable) where individual questions have fewer responses. AOPA's 2019 Weather Survey did benefit from a large sample size, comparable to that of its 2018 Weather Survey. The 2017 sample size (380 respondents) was significantly smaller than samples in 2018 (2,849) and 2019 (2,267) resulting in a significantly larger margin of error in the 2017 data. The 2019 survey also had a larger percentage of Alaskan pilots respond, reducing the margin of error for that cohort.

Second, note that the potential for bias towards AOPA exists, as the survey was released by AOPA, to AOPA members. Respondents noting the survey's source (AOPA) may have already had more favorable opinions regarding AOPA, and thus may have been more likely to use products and services sponsored by AOPA (e.g., the AOPA Flight Planner). The same bias could exist in previous incarnations of the AOPA Weather Survey, as well.

Finally, the potential for bias in interpreting open-ended responses exists. Coders (here defined as people who read answers to free-response questions, often searching for and noting predominant themes) must avoid making assumptions about the content of potentially vague answers to free-response questions. For example, one participant in the present study answered an open-ended question about text AIRMETs by saying, "It helps."⁵ The coder has no way to know why the respondent said that and must not make any guesses – no matter how well-informed those guesses might seem to be. The potential for bias (and resulting lack of accuracy) in coding free-response questions exists even with multiple trained readers. Interrater reliability statistics can help estimate the existence of bias in such a scenario. However, AOPA uses a single coder, which prevents calculation of interrater reliability. AOPA strives to provide thorough, accurate, and reliable assessments of all available data, and so openly acknowledges these limitations.

⁵ When asked to explain how the removal of text AIRMETs would impact his or her flying, one participant in AOPA's 2019 Weather Survey responded, "It helps."

The Aircraft Owners and Pilots Association (AOPA) is a not-for-profit individual membership organization of general aviation pilots and aircraft owners. AOPA's mission is to effectively serve the interests of its members and establish, maintain and articulate positions of leadership to promote the economy, safety, utility and popularity of flight in general aviation aircraft. Representing two thirds of all pilots in the United States, AOPA is the largest civil aviation organization in the world.

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