APPENDIX A

METHODOLOGY FOR THE 2005 GENERAL AVIATION AND AIR TAXI ACTIVITY AND AVIONICS (GAATAA) SURVEY

Purpose of Survey

The purpose of the GAATAA Survey is to provide the Federal Aviation Administration (FAA) with information on general aviation and on-demand Part 135 aircraft activity. The information obtained from the survey enables the FAA to monitor the general aviation fleet so that it can, among other activities, anticipate and meet demand for National Airspace System (NAS) facilities and services, assess the impact of regulatory changes on the fleet, and implement measures to assure the safe operation of all aircraft in NAS. The data collected are also used by other government agencies, the general aviation industry, trade associations, and private businesses to pinpoint safety problems and to form the basis for critical research and analysis of general aviation issues.

Background and History

Prior to the first implementation of the annual GAATAA Survey in 1978, the FAA used the Aircraft Registration Eligibility, Identification, and Activity Report (AC Form 8050-73) to collect data on general aviation activity. The form was sent annually to all owners of civil aircraft in the United States and served two purposes: (1) Part 1 was the mandatory aircraft registration revalidation form, and (2) Part 2 was voluntary and applied to general aviation aircraft only, asking questions on the owner-discretionary characteristics of the aircraft such as flight hours, avionics equipment, base location, and use. The FAA used this information to estimate aircraft activity.

In 1978, the FAA replaced AC Form 8050-73 with a new system: Part 1 was replaced by a triennial registration program. In January 1978, the FAA implemented a new procedure, known as triennial revalidation, for maintaining its master file. Instead of requiring all aircraft owners to revalidate and update their aircraft registration annually, the FAA only required revalidation for those aircraft owners who had not contacted the FAA Registry for three years. This less frequent updating of the master file affected its accuracy and representativeness:

1. The accuracy of current owners and their addresses deteriorated.

2. The master file combined a residue of aircraft, which under the old revalidation system would have been reregistered and purged from the file, but now remain under the new system.

Part 2 of AC Form 8050-73 was replaced by the General Aviation Activity (GAA) Survey. Conducted annually, the survey is based on a statistically selected sample of aircraft, and it requests the same type of information as Part 2 of AC Form 8050-73. The first GAA Survey took place in 1978, collecting data on the 1977 general aviation fleet.

In 1993, the name of the GAA Survey was changed to the General Aviation and Air Taxi Activity (GAATA) Survey to reflect that the survey includes air taxi (that is, on-demand Part 135) aircraft. Starting in 1999, the avionics section, which was previously included only every other year, was asked every year. As a result, the survey's name was changed to the General Aviation and Air Taxi Activity and Avionics (GAATAA) Survey. This is the name under which the 2005 survey was conducted.

The GAATAA Survey has undergone periodic revisions to content, implementation, and definition of the GA population in order to remain current with regulations, activity patterns, and general aviation community. The table below summarizes changes in survey content.

Year	Description of change to survey content
1993	Added sightseeing and external load to use categories
1996	Added public use (i.e., flights for the purpose of fulfilling a government function) to use categories
1999	Significant re-design of the entire survey form to reduce item non-response, add new content, and be compatible with optical scanning Added air medical services to use categories Discontinued the use of a catch-all 'other' category as used in previous years Began collecting avionics data every year, rather than every other year
2000	Public use asked as a separate question, independent of other use categories (e.g., personal/recreation, business transportation), because it was not mutually exclusive with respect to other flight activity
2002	Use categories refined to be mutually exclusive and exhaustive and match definitions used by NTSB for accident reporting
2004	Air medical services was divided into two separate types to capture air medical flights under Part 135 and air medical flights not covered by Part 135 A more clearly defined 'other' category was reintroduced
2005	Fractional ownership question was changed from yes/no to a percentage Reduced the number of fuel type response categories by removing obsolete options Added question asking for average fuel consumption (in gallons per hour) Revised avionics page by adding and rearranging items

The table below summarizes changes in survey implementation.

Year	Description of change to survey implementation
1999	Non-respondent telephone survey conducted to adjust active aircraft and hours flown estimates[1] Sample design revised to stratify by aircraft type (19 categories) and FAA region (9 categories)[2]
2000	Discontinued non-respondent telephone survey because of the variability of telephone non-respondent factors Added Internet response option
2003	Added a reminder/thank-you postcard between the first and second mailings
2004	Introduced "multiple aircraft" summary form to allow owners/operators of multiple aircraft to report aggregate data for their entire fleet on a single form Phone calls placed by PA and aviation associations to encourage participation by large fleet operators

The table below summarizes changes to the definition of the general aviation population and sample design.

Year	Description of change to definition of the GA population and sample design
1993	Number of aircraft types classified by the sample was expanded from 13 to 19
2003	Aircraft with known incorrect addresses and identified as "Postmaster Return" status on the Registry were retained in the definition of the survey population and were eligible for selection into the survey sample
2004	Aircraft reported as "registration pending" or sold (if sold status less than 5 years) on the Registry were retained in the definition of the survey population and were eligible for selection into the survey sample Sample design revised to stratify by aircraft type (19 categories), FAA region (9 categories), and whether or not the aircraft is owned by an entity certified to fly Part 135 (2 categories) Introduced 100% sample of the following groups: turbine aircraft, rotorcraft, on-demand Part 135 aircraft, and Alaska-based aircraft
2005	Sample design and reporting revised by introducing Light-sport aircraft as a 20th aircraft type sampled at 100%

The 2005 statistics in this report were derived from the twenty-eighth GAATAA Survey, which was implemented in 2006.

[1] Telephone surveys of non-respondents also were conducted in 1977, 1978, 1979, 1997, and 1998. Please refer to the 1999 GAATAA Survey report for a full discussion of the telephone survey of non-respondents.
[2] Before 1999, the sample was stratified by aircraft type (19 categories) and state/territory (54 categories).

Improvements to the 2005 Survey

As part of ongoing efforts to improve the survey data, four key changes were made to the 2005 survey:

1. The field period opened on March 29, 2006, the earliest date since the large-scale survey re-design in 1999.

2. To gather more accurate fuel consumption data, a question was added asking for average fuel consumption (in gallons per hour).

3. In order to remain current with technological advances, the avionics section was revised by adding and rearranging items.

4. Light-sport aircraft were added as a 20th aircraft type, and are reported as a separate category

Each of these improvement is discussed in further detail in subsequent sections of this Appendix.

Survey Population and Survey Sample

The survey population for the 2005 General Aviation and Air Taxi Activity and Avionics Survey includes all civil aircraft registered with the FAA that are based in the U.S. or U.S. territories and that were in existence and potentially active between January 1 and December 31, 2005.[3] This includes aircraft operating under:

- Part 91: General operating and flight rules.

- Part 125: Certification and operations: Airplanes having a seating capacity of 20 or more passengers or a maximum payload capacity of 6,000 pounds or more (but not for hire).

- Part 133: Rotorcraft external load operations.

- Part 135: On-demand (air taxi) and commuter operations not covered by Part 121.

- Part 137: Agricultural aircraft operations.

Aircraft operating under Part 121 as defined in Part 119 are excluded from the survey population. Foreign air carriers, which operate under Part 129, are also not part of the survey population. Civil aircraft that are known not to be potentially active during the survey year are also excluded from the population—i.e., aircraft displayed in museums, aircraft destroyed prior to January 1, 2005.

[3] According to the FAA Aircraft Registration Master File—the sample frame for the survey (discussed below)--over 99 percent of the aircraft in the 2005 survey population were registered to owners in the 50 states, the District of Columbia, Puerto Rico or other U.S. territories, such as American Samoa, Guam, and the Virgin Islands.

The Aircraft Registration Master File, maintained by the FAA's Mike Monroney Aeronautical Center in Oklahoma City, serves as the sample frame or list of cases from which a sample of civil aircraft is selected. The Registration Master File ("Registry") is the official record of registered civil aircraft in the United States. For the purpose of defining the 2005 survey population, we used the Registry's list of aircraft as of December 31, 2005.

The Registry, like all sample frames, is an imperfect representation of the survey population. While it may exclude a very small number of aircraft that operate under the FAA regulations governing the operation of general aviation and on-demand Part 135 aircraft, it also includes aircraft that are not part of the survey population. Prior to sample selection, several steps are taken to remove ineligible aircraft from the sample frame. Specifically, this includes removing the following:

- Aircraft missing key identifiers that are necessary for classification or merging with other data sources (e.g., N-number, serial number, make/model information)
- Aircraft whose registration has been cancelled or revoked
- Aircraft based in Europe or registered to a foreign company that have not returned flight hour reports
- Aircraft that operate under Part 121
- Aircraft destroyed or moved to museums prior to January 1, 2005
- Aircraft reported sold before 2000 (5 years prior to survey year)[4]
- Aircraft that are flagged Postmaster Return (known to have incorrect address information) since before 1995 (10 years prior to survey year)
- Aircraft that are missing information on the registrant's name (i.e., the field is blank) (Aircraft for which the registrant is listed as "Pending" are retained in the survey population[5])
- Aircraft that lack information necessary to execute the sample design (i.e., aircraft type, FAA region)

The Registry included 359,516 aircraft as of December 31, 2005. After excluding the aircraft described above, the sample frame contained 298,901 records used to define the general aviation population.

Sample Design

The 2005 GAATAA Survey Sample is stratified by aircraft type (20), FAA region in which the aircraft is registered (9), and whether the aircraft operates under a Part 135 certificate (2). Part 135 aircraft were identified using the FAA's Operations Specifications Subsystem (OPSS)

[4] Prior to 2004, aircraft were excluded if reported sold more than 1 year prior to the survey year.
[5] Prior to 2004, aircraft with "Registration Pending" were excluded from the population.

database that was merged with the Registry by N-number. The three stratifying variables yield a matrix of 360 cells.

The 2005 survey sample included several types of aircraft that were sampled at a rate of 1.0 (i.e., 100 percent sample). Because of the FAA's interest in gaining a better understanding of the operation of these aircraft, all such aircraft listed in the Registry were included in the survey sample to ensure a sufficient number of survey completes to support analysis and provide more precise estimates of fleet size and aircraft activity. These include:

- 100 percent sample of turbine aircraft (turboprops and tubojets)
- 100 percent sample of rotorcraft
- 100 percent sample of aircraft operating on-demand Part 135
- 100 percent sample of aircraft based in Alaska

Altogether, these aircraft contributed 42,543 observations to the 2005 survey sample.

In addition to the four groups listed above, the 2005 GAATAA Survey tracked Light-sport aircraft as a 20th aircraft type for the first time. Because the survey universe contained only 193 Light-sport aircraft, these aircraft were also sampled at 100 percent.

Other aircraft that are not part of a 100 percent sample are subject to selection based on sampling fractions defined for each cell in the sample design matrix. Average annual flight hours is the primary measure needed by the FAA to address survey goals. Sample fractions for each sample strata are defined to optimize sample size to obtain a desired level of precision for an estimate of flight activity. Data from the previous survey year on average hours flown, variability in hours flown by region and aircraft type, and response rates are used to set precision levels and identify the optimal sample size for each strata. Aircraft are randomly selected from each cell in the matrix, subject to the desired sample size. Strata that yield a very small sample size are examined and adjusted to include all observations in the strata if necessary. In 2005, an additional 34,667 aircraft were sampled at a rate of less than 1.0, yielding a total survey sample of 77,403. Table A.1 shows the number of aircraft selected into the survey sample, by aircraft type, as well as the proportion of the population represented by the sample.

TABLE A.1: SURVEY SAMPLE AND POPULATION FIGURES BY AIRCRAFT TYPE

Aircraft Type	Population	Sample Size	Sample as Percent of Population
Fixed Wing - Piston			
1 engine, 1-3 seats	64,841	15,618	24.1
1 engine, 4+ seats	128,059	14,531	11.3
2 engines, 1-6 seats	16,181	4,772	29.5
2 engines, 7+ seats	7,475	2,127	28.5
Piston: Other	227	227	100.0
Fixed Wing - Turboprop			
1 engine	2,809	2,809	100.0
2 engines, 1-12 seats	4,806	4,806	100.0
2 engines, 13+ seats	977	977	100.0
Turboprop: Other	78	78	100.0
Fixed Wing - Turbojet			
2 engines	9,750	9,750	100.0
Turbojet: Other	1,027	1,027	100.0
Rotorcraft			
Piston	4,452	4,452	100.0
Turbine: 1 engine	5,891	5,891	100.0
Turbine: Multi-engine	1,322	1,322	100.0
Other Aircraft			
Glider	3,201	1,448	45.2
Lighter-than-air	7,160	1,823	25.5
Experimental			
Amateur	34,907	2,936	8.4
Exhibition	3,180	1,049	33.0
Experimental: Other	2,365	1,567	66.3
Light-sport	193	193	100.0
Total	298,901	77,403	25.9

Weighting the Survey Data

Data from completed surveys are weighted to reflect population characteristics. The weights reflect the proportion of aircraft sampled from the population in each sample strata and differential response as well as a small adjustment for aircraft that are not part of the survey population.

Initially, each aircraft for which we receive a completed survey is given a weight that reflects sampling fraction and differential response. That is:

WEIGHT = (Population N_{ijk}/Sample N_{ijk}) * (N Respondents$_{ijk}$/Sample N_{ijk})

where i, j, and k represent the three sample strata of aircraft type, FAA region, and Part 135 status.

The weight is subsequently adjusted to reflect new information about non-general aviation aircraft. That is, survey responses that identify an aircraft as not being part of the survey population—destroyed prior to January 1, 2005; displayed in a museum; operated primarily as an air carrier under Part 121 or 129; or a military aircraft—are used to remove aircraft proportionally from the sample and from the population. This adjustment is done at the level of the 20 aircraft types. The procedure assumes that non-GA aircraft occur in the same proportion among survey respondents and non-respondents. To the extent that non-GA aircraft are less likely to receive and complete a survey, this approach will underestimate the adjustment for aircraft that are not part of the general aviation population.

Errors in Survey Data

Errors associated with survey data can be classified into two types—sampling and non-sampling errors. Sampling errors occur because the estimates are based on a sample of aircraft rather than the entire population, and we can expect, by chance alone, that some aircraft selected into the sample differ from aircraft that were not selected.

Non-sampling errors can be further subdivided into a) errors that arise from difficulties in the execution of the sample (e.g., failing to obtain completed interviews with all sample units) and b) errors caused by other factors, such as misinterpretation of questions, inability or unwillingness to provide accurate answers, or mistakes in recording or coding data.

Sampling Error

The true sampling error is never known, but in a designed survey we can estimate the potential magnitude of error due to sampling. This estimate is the standard error. The standard error measures the variation that would occur among the estimates from all possible samples of the same design from the same population.

This publication reports a standard error for each estimate based on survey sample data. An estimate and its standard error can be used to construct an interval estimate ("confidence interval") with a prescribed level of confidence that the interval contains the true population figure. In general, as standard errors decrease in size we say the estimate has greater precision (the confidence interval is narrower), while as standard errors increase in size the estimate is less precise (the confidence interval is wider). Table A.2 shows selected interval widths and their corresponding confidence.

TABLE A.2: CONFIDENCE OF INTERVAL ESTIMATES

WIDTH OF INTERVAL	APPROXIMATE CONFIDENCE THAT INTERVAL INCLUDES TRUE POPULATION VALUE
1 Standard error	68%
2 Standard error	95%
3 Standard error	99%

This report presents a "percent standard error" for each estimate, which is the standard error relative to the mean. The percent standard error is simply the ratio of the standard error to its estimate multiplied by 100. For example, if the estimate is 4,376 and the standard error is 30.632, then the percent standard error is (30.632/4,376) * 100 = 0.7. Reporting percent standard errors makes it possible to compare the precision of estimates across categories.

Estimates and percent standard errors reported in Table 2.1 provide an example of how to compute and interpret confidence intervals. To obtain, for example, a 95 percent confidence interval for the estimated number of total hours flown for turbojets in 2005, where the total hours flown is estimated to be 3,767,327 and the percent standard error of the estimate is 0.8, the following computation applies:

Lower confidence limit: 3,767,327 – 2(0.8/100)(3,767,327) = 3,707,050

Upper confidence limit: 3,767,327 + 2(0.8/100)(3,767,327) = 3,827,604

In other words, if we drew repeated samples of the same design, 95 percent of the estimates of the total hours flown by turbojets would fall between 3,707,050 and 3,827,604.

Non-sampling Error

Sampling error is estimable and can be reduced through survey design (e.g., by increasing sample size), but it is difficult, if not impossible, to quantify the amount of non-sampling error. Although extensive efforts are undertaken to minimize non-sampling error, the success of these measures cannot be quantified.

Steps taken to reduce non-sampling error fall into two classes—strategies to reduce non-response and efforts to minimize measurement and coding errors. To this end, implementation and design of the 2005 GAATAA Survey incorporated the following steps to maximize cooperation among sample members:

- Two modes of administration to facilitate access to the survey—a postcard invitation to complete the survey on the Internet followed by a mail survey to be completed by pen or pencil
- Three mailings of the survey to individuals who had not yet responded, as well as a reminder/thank-you postcard
- Cover letters accompanying each survey mailing clearly explained the purpose of the survey as well as the endorsement (organizational logos) of several aviation associations[6]
- Cover letters assured owners of the confidentiality of their responses and informed them: "Names of individuals are never associated with responses. There is an identification number on your survey only so [survey contractor] knows who should receive the survey."

[6] The following associations' logos appeared on the 2005 cover letter: Aircraft Owners and Pilots Association (AOPA), Experimental Aircraft Association (EAA), General Aviation Manufacturers Association (GAMA), Helicopter Association International (HAI), National Agricultural Aviation Association (NAAA), National Air Transportation Association (NATA), National Business Aviation Association (NBAA), Small Aircraft Manufacturers Association (SAMA).

- Use of additional sources to obtain updated contact information and help ensure the mail survey reaches the sample member (e.g., National Change of Address, updates from aviation associations)

- Use of a toll-free 800 telephone number and email address to respond to questions

- Collaboration with aviation organizations and industry groups to encourage cooperation of owners or operators of multiple aircraft

The survey also reflects efforts to minimize measurement error by increasing the likelihood that respondents share a common understanding of survey questions and reducing errors in data coding. These include:

- Close collaboration with the FAA, other federal agencies and aviation groups to refine and clarify question wording as well as definitions to questions. The questionnaire is re-examined each year to identify ambiguities or revisions necessary to remain consistent with aviation regulations and definitions.

- Significant reviews and re-designs of the questionnaire have been undertaken periodically (see "Background" section of this report). Each re-design is thoroughly pre-tested with a sample of aircraft owners or operators and, if necessary, modified on the basis of the pre-test results.

- Comprehensive editing and verification procedures to ensure the accuracy of data transcription to machine-readable form as well as internal consistency of responses.

Survey Content

The 2005 GAATAA Survey questionnaire, shown in figure B.1 of Appendix B, requests the aircraft owner or operator to provide the following information on the sampled aircraft's characteristics and uses:

1. Number of total hours flown in 2005, and hours flown by use

2. Airframe hour reading and the aircraft's base location as of December 31, 2005

3. IFR hours, percentage of hours flown in Instrument Meteorological Conditions (IMC) and Visual Meteorological Conditions (VMC) during the day and evening

4. Number of landings in 2005

5. Fuel type and average fuel consumption

6. Whether the aircraft was part of a fractional ownership program in 2005

7. Avionics equipage

The survey questionnaire was largely unchanged from the 2004 survey to the 2005 survey, with the following exceptions:

- The fractional ownership question (Q6) was changed from yes/no to a percentage. This allows hours flown by aircraft that operate only *part of the time* under a fractional ownership program to be reported proportionally rather than an "all or nothing" manner. Also, this item was moved to page 2 of the questionnaire.

- Based on recommendations by the FAA and industry experts, the following fuel types were removed from Q15: propane, aviation fuel - 80 Octane, and 82 UL.

- To gather more accurate fuel consumption data, a question was added asking for average fuel consumption (in gallons per hour). Prior to the 2005 survey, fuel burn rates were hard coded based on the 19 aircraft types. This procedure was adopted from earlier years, and the origin of the hard coded values is uncertain. The estimates presented in the 2005 GAATAA report are based on a new question (Q16), which asks respondents to report their average fuel consumption rate. This figure is multiplied by the total hours reported to calculate total fuel consumed. Fuel consumption estimates in 2005 should reflect differences by aircraft makes-models, use patterns, etc. more accurately.

- In order to reflect technological advances, the avionics section was revised by adding and rearranging items. Items which were added to the 2005 survey include:

    - Integrated All-glass Cockpit
    - Electronic Flight Bag (EFB) - Installed
    - IFR LPV Approach (WAAS)
    - ADS-B (Mode S)
    - ADS-B (UAT)
    - Altitude Preselect
    - Attitude & Heading Reference System (AHRS)

Survey Method

Appendix B presents the materials used to conduct the 2005 survey. The standard survey form is shown in Figure B.1. The postcard invitation to the Internet component and the reminder/ thank-you postcard are shown in Figure B.2. Each of the three mailings for the standard survey was accompanied by a cover letter, shown respectively in Figures B.3, B.4, and B.5.

The protocol used for the 2005 survey is similar to that used since the 2000 survey. The survey data were collected from owners and operators of the sampled aircraft through two venues – the Internet and mailings of the questionnaire. The Internet component was implemented before the mailing portion to capture as many respondents electronically as possible. Sampled aircraft were first sent a postcard inviting them to participate in the Internet version of the survey. The postcard was sent out on March 29, 2006, and the Internet component continued through August 14, 2006.

There were three mailings of the standard questionnaire, and a reminder/thank-you postcard sent between the first and second mailings. The first questionnaire mailing, sent out on April 26, 2006, covered 52,330 aircraft in the sample that had not completed a survey via the Internet or had not received a final disposition due to a returned postcard (refused, respondent deceased, undeliverable with no new address, etc.). The reminder/thank-you postcard was sent on

May 17, 2006, and included only those aircraft in the sample that had not yet responded to the survey and were not part of the non-active sample. The second survey mailing was sent on June 1, 2006, and included only those aircraft in the sample that had not yet responded to the survey and were not part of the non-active sample. The third mailing was sent on July 6, 2006, to owners and operators of the sampled aircraft who had not responded to the first or second mailings.

Alternative Survey for Reporting on Multiple Aircraft

The 2005 GAATAA Survey continued the effort initiated with the 2004 GAATAA Survey to increase cooperation among respondents who own or operate multiple aircraft. To achieve this objective, the 2005 survey employed the data collection tools and methods introduced in 2004.

The responses of multiple-aircraft owners/operators are extremely important for accurately estimating general aviation activity. Because of the increased burden of reporting for multiple aircraft, there was a concern that these high-end, high-use operators were less likely to respond to the survey. Therefore, after the sample was selected, the FAA's Operations Specifications Subsystem (OPSS) was used to group aircraft belonging to the same operator's fleet. Operators with three or more aircraft were classified as "multiple owners/operators" for survey purposes, regardless of the number of their aircraft present in the survey sample.

To avoid confusion among respondents, aircraft were assigned to a single data collection track. The 11,093 aircraft in the "multiple owner/operator" track followed an independent protocol developed last year. The remaining 66,310 aircraft followed the same protocol used in previous years and is described above.

In order to minimize the reporting burden on operators of multiple aircraft, a summary survey was developed with the cooperation of several aircraft operators and aviation associations to enable an operator to report activity for an entire fleet on a single condensed form, instead of completing the longer questionnaire for each individual aircraft. This survey form (Appendix B, Figure B.6) allows operators to report on key variables for major classes of aircraft, including hours flown, how flown, fuel consumption, and number of landings. The form did not collect data on flying conditions, fuel type, fractional ownership, or avionics.

Data collection for multiple-aircraft owners/operators followed the same timing as the standard data collection track. Like the standard survey protocol, an Internet survey that matched the mail questionnaire was programmed to allow online reporting.

To maximize the survey response rate, follow-up phone calls were placed to all multiple-aircraft owners/operators. These calls focused not only on encouraging survey participation, but also on ensuring survey mailings were reaching the appropriate person in the operator's organization. In many cases, aviation associations with which operators had an existing relationship made these telephone calls.

Benefits resulting from the new systems of data collection implemented since 2000 include quicker processing of the results, improved data quality, and considerable savings of time and money to both the public and the federal government.

Response Rate

As shown in Table A.3, the overall response rate for the 2005 survey was 44.5 percent [7]. The response rate for the Internet portion of the survey was 18.9 percent and accounted for 41.9 percent of the total responses to the survey. The first mailing had a response rate of 17.2 percent and accounted for 30.5 percent of the total responses to the survey. The second mailing had a response rate of 9.6 percent, which accounted for 20.5 percent of the total responses to the survey. The third mailing produced a response rate of 7.3 percent, approximately 7.1 percent of the total responses to the survey.

TABLE A.3: SUMMARY OF RESPONSE INFORMATION

Phase	Valid Sample[8]	Completes[9]	Response Rate	% Total Response
Internet	77,199	14,555	18.9%	42.5%
1st Mailing	66,203	11,395	17.2%	33.3%
2nd Mailing	52,426	5,037	9.6%	14.7%
3rd Mailing	44,337	3,238	7.3%	9.5%
Overall	76,902	34,248	44.5%	100.0%

Table A.4 illustrates the steady increase in the Internet response as a percentage of all returned surveys from 2000 to 2005 (16.4 percent for 2000 compared with 42.5 percent for 2005). This increase in response illustrates an increasing effectiveness of utilizing the Internet for data collection, thereby improving the efficiency and cost savings of the data collection process.

TABLE A.4: PERCENTAGE OF ALL COMPLETED SURVEYS RESPONDING BY INTERNET

	2000	2001	2002	2003	2004	2005
Total Completes	15,689	16,432	15,254	14,471	32,056	34,248
Internet Completes	5,144	5,954	5,304	6,059	13,441	14,555
Internet % of Total	32.8%	36.2%	34.8%	41.9%	41.9%	42.5%

[7] Although the 2005 response rate of 44.5% represents a decrease from response rates prior to 2003, this decrease is attributable to changes in survey methodology that have occurred over the past 6 years. The inclusion of bad addresses in the response rate calculation, adding more aircraft registered as “Sale Reported” or “Registration Pending” to the survey population, and other factors have resulted in the decrease to the response rate.

[8] Even though efforts are made to remove non-GA aircraft from the population before the sample is selected, a small number of surveys are returned each year indicating that the aircraft should not be part of the survey population (e.g., the aircraft was used primarily as a Part 121 air carrier, or was a museum piece the entire survey year). The Total Valid Sample Size used to compute the overall survey response rate excludes such aircraft.

[9] The total number of completes is not an exact sum of the separate components due to a small number of aircraft that did not receive a mailing but that were reported by a large fleet and therefore received a complete disposition.

Table A.5 shows responses by aircraft type.

TABLE A.5: RESPONSE RATE BY AIRCRAFT TYPE

Aircraft Type	Sample	Invalid Sample[10]	Responses	Response Rate
Fixed Wing - Piston				
1 engine, 1-3 seats	15,618	112	7,557	48.7%
1 engine, 4+ seats	14,531	66	7,195	49.7%
2 engines, 1-6 seats	4,772	23	2,124	44.7%
2 engines, 7+ seats	2,127	7	820	38.7%
Piston: Other	227	2	48	21.3%
Fixed Wing - Turboprop				
1 engine	2,809	19	1,337	47.9%
2 engines, 1-12 seats	4,806	33	1,903	39.9%
2 engines, 13+ seats	977	3	301	30.9%
Turboprop: Other	78	1	18	23.4%
Fixed Wing - Turbojet				
2 engines	9,750	49	4,301	44.3%
Turbojet: Other	1,027	9	280	27.5%
Rotorcraft				
Piston	4,452	31	1,449	32.8%
Turbine: 1 engine	5,891	35	2,241	38.3%
Turbine: Multi-engine	1,322	3	616	46.7%
Other Aircraft				
Glider	1,448	10	700	48.7%
Lighter-than-air	1,823	22	652	36.2%
Experimental				
Amateur	2,936	36	1,509	52.0%
Exhibition	1,049	29	464	45.5%
Experimental: Other	1,567	10	611	39.2%
Light-sport	193	1	122	63.5%
Total	77,403	501	34,248	44.5%

[10] Even though efforts are made to remove non-GA aircraft from the population before the sample is selected, a small number of surveys are returned each year indicating that the aircraft should not be part of the survey population (e.g., the aircraft was used primarily as a Part 121 air carrier, or was a museum piece the entire survey year). The Invalid Sample represents such aircraft, which are excluded from response rate calculations.