

2019

Aviation Annual Report



Aviation Annual Report
U.S. Forest Service
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Executive Summary

This report summarizes US Forest Service aviation business data to characterize annual aviation use and costs for contract and Agency-owned aircraft. Data summaries are presented to generate a picture of annual use at the Agency management scale, and analysis methods are standardized to facilitate observation of trends in future annual reports. Summaries are presented by calendar year (January 1 – December 31) to capture fire seasons and contracting cycles more thoroughly.

Data presented herein are from Incident Business System (IBS) obtained via the FAMWEB Data Warehouse. Additionally, some summaries are provided by Agency aviation program specialists, contract specialists, or Regional Aviation Officers.

2019 was a relatively low demand fire year. In 2019, all Forest Service Agency-owned and contracted aircraft flew 42,570 hours, which was well below the 5-year average and any of the recent years of record.

Table 1 summarizes the Agency fleet, showing both the number of aircraft awarded a contract line item and those available to the Agency for use from other sources. These numbers are not reflective of the actual number of aircraft utilized though because a Call When Needed (CWN) aircraft may not have been available at the time of a resource order and some Exclusive Use aircraft are also awarded CWN contracts.

Report Disclaimer

Incident Business System (IBS) archived aircraft use and costs data are stored in the FAMWEB Data Warehouse. This information tracks aviation use for the Forest Service, and summaries provided in this report are only as accurate as the archived data. Summaries provided may represent both fire and non-fire flight missions (e.g., wildlife tracking or forest health survey flights).

Not all aircraft utilized by the Agency are billed through ABS (e.g., military aircraft with MAFFS units). Missing data and data entry errors may persist in the archived data and subsequent analyses. ABS is an Agency invoicing tool and was not designed for historical analyses. The Forest Service updates ABS data as payments are processed.

Inconsistencies, omissions, or obvious data errors may be manually corrected prior to completion of the annual analyses; these corrections will be noted.

Summary totals may not align precisely with itemized values due to rounding practices.

Table 1 – CY 2019 Forest Service Aircraft Fleet Summary

	Number of Aircraft
Helicopters	
Exclusive Use (EXU)	102
Call When Needed (CWN)	310
Agency Owned	3
Airtankers	
Next Generation – EXU	13
Next Generation – CWN	22
MAFFS	8
SEAT – EXU	1
Water Scoopers	
Call When Needed (CWN)	4
Fixed-Wing	
Aerial Supervision Module/ Leadplane (Lease)	15
Light Fixed-Wing ATGS (EXU)	22
Light Fixed-Wing ATGS (CWN)	75 ¹
Smokejumper Aircraft (EXU)	5
Smokejumper Aircraft (CWN)	0
Large Transport (EXU)	2
Other Regional Light Fixed-Wing (CWN)	61 ¹
Fixed-Wing (Agency Owned)	19

¹ Value is approximated based on 2018 report numbers. CWN light fixed-wing aircraft that may be utilized for ATGS missions as needed are managed under Regional contracts for various non-fire missions.

Aviation Utilization and Cost Information

The Forest Service provides aircraft for both fire and non-fire missions. Although the Agency owns a limited number of aircraft, contract aircraft account for most of the aviation assets available for mission-related work. In 2019, 418 contract aircraft and 22 Agency-owned aircraft were utilized to meet Agency missions.²

This report categorizes aircraft into four groups: fixed-wing, helicopter, airtanker, and scooper. The data summaries include both Agency-owned and contract aircraft, unless otherwise noted. The fixed-wing category includes the National Interagency Fire Center large transport jet, smokejumper aircraft, leadplanes, air attack, and all other fixed-wing aircraft not operating for the sole purpose of delivering a fire suppressant. The helicopter category includes all rotor-wing aircraft, regardless of flight missions. Unless otherwise noted, the airtanker category includes all flights and charges associated with any fixed-wing aircraft delivering a fire chemical suppressant to a fire (i.e., Single Engine Airtanker (SEAT), Large Airtanker (LAT), and Very Large Airtanker (VLAT)). Finally, scoopers are water scooping fixed-wing aircraft used in fire suppression.

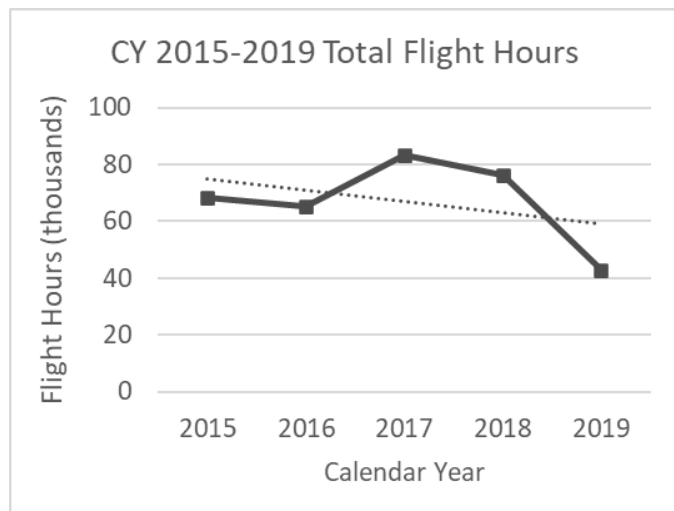
2019 At-A-Glance

Aviation Use

Agency and contract aircraft flew 42,570 hours in calendar year 2019 (Figure 1), which was the least amount of annual flight time in the last 5 years; the 5-year average (2015-19) is 67,036 hours. The majority of the 42,570 flight hours were fire related with 87.5 percent of the annual flight hours, 9.5 percent were resource missions (non-fire), and 3.1 percent were for prescribed fire. Aircraft activity peaked in July and August, with 51% of all annual flight hours (Figure 2).

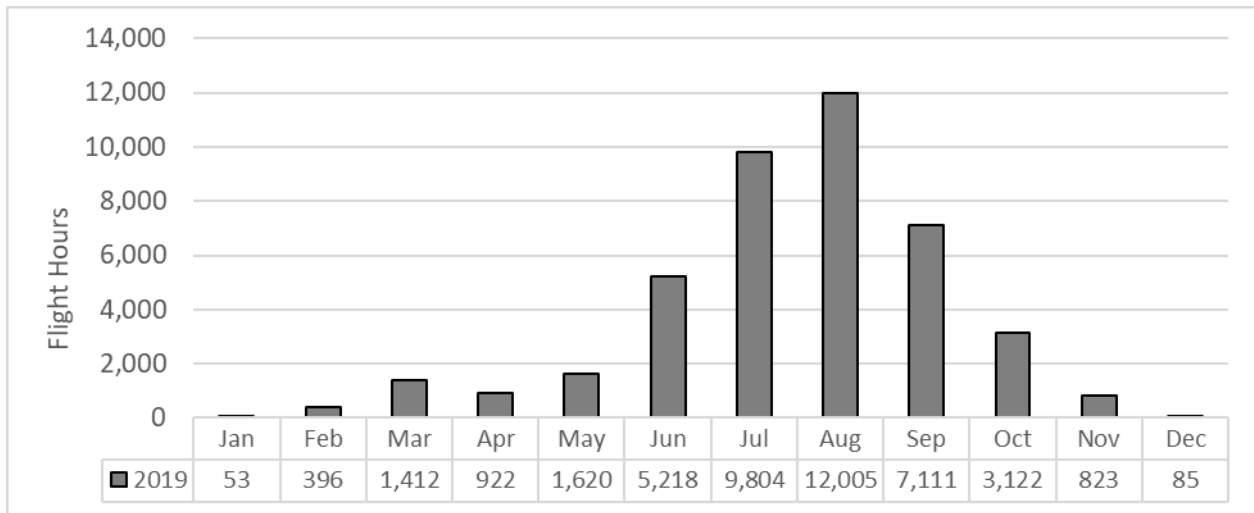
Figure 1 – CY 2015-2019 Total Agency Flight Time

Calendar Year	Flight Hours
2015	68,137
2016	65,071
2017	83,184
2018	76,230
2019	42,570
5-Year Average	67,036



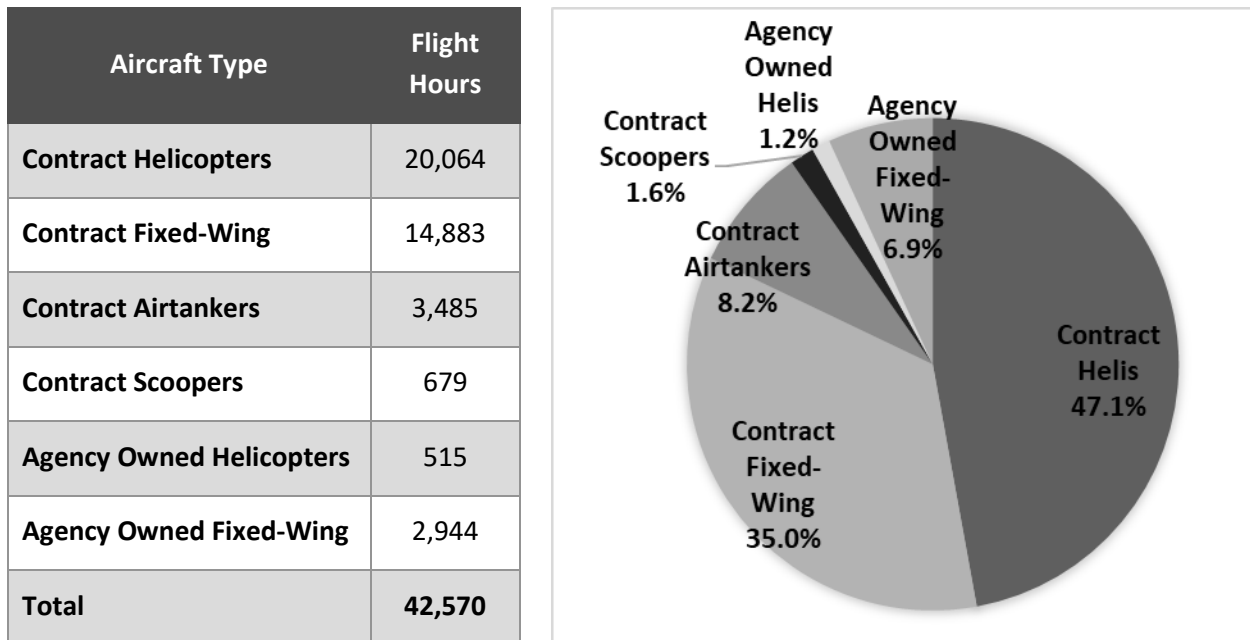
² Values reflect the actual number of unique aircraft that operated and may not align with fleet size values due to contract processes (e.g., aircraft swaps, multiple contract awards).

Figure 2 – CY 2019 Total Agency Flight Time by Month



Flight time for contract aircraft represented 91.9% of the annual total; Agency flight hours accounted for the remaining 8.1% (Figure 3). Examination of the distribution of use by aircraft type and ownership demonstrates that contract helicopters (47.1%) and contract fixed-wing (35.0%) represented the largest proportion of use (Figure 3).

Figure 3 – CY 2019 Total Agency Flight Time by Aircraft and Contract Type



Flight hours in support of Agency missions accounted for the bulk of flight time (74.3%), with 11.4% of flight hours attributed to Department of Interior missions, 14.1% to non-Federal missions, and <1% for missions related to other or unknown jurisdictions (Table 2).

Table 2 – CY 2019 Total Agency Flight Time by Region/Agency³

Region/Agency	Flight Hours	Percent of Total Flight Hours
FS: Region 1	3,486	8.2%
FS: Region 2	1,867	4.4%
FS: Region 3	4,037	9.5%
FS: Region 4	4,385	10.3%
FS: Region 5	6,361	14.9%
FS: Region 6	3,933	9.2%
FS: Region 8	1,949	4.6%
FS: Region 9	1,213	2.8%
FS: Region 10	1,527	3.6%
FS: Region 13 (WO)	2,277	5.3%
FS: Region Other (Research Stations, CIO, etc.)	573	1.3%
FS Total	31,608	74.3%
BIA	614	1.4%
BLM	3,863	9.1%
FWS	155	0.4%
NPS	202	0.5%
DOI Total	4,835	11.4%
Non-Fed Fire (State)	5,987	14.1%
Other	140	<1%
Grand Total	42,570	100%

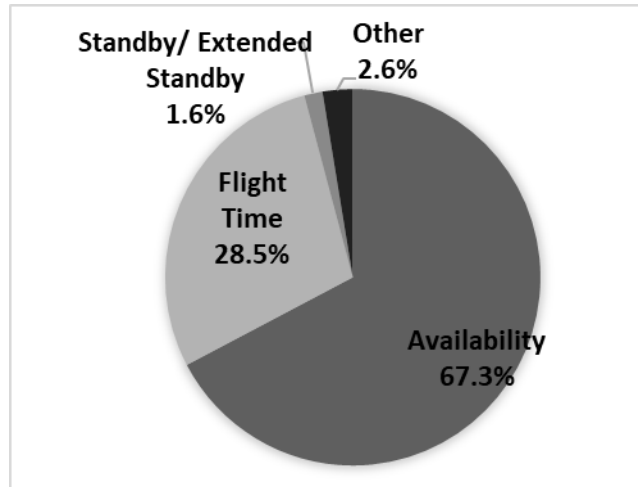
³ Region/Agency derived from Incident Finance Job Codes from ABS data.

Aviation Costs

In CY 2019, Agency expenditures for contract aircraft totaled \$392.7 million. More than two-thirds of all charges went to availability pay codes (67.3%). 28.5% went to flight time costs; remaining expenses were attributed to standby/ extended standby (1.6%) and other pay codes (2.6%; Figure 4).

Figure 4 – CY 2019 Aviation Contract Costs by Pay Code Description

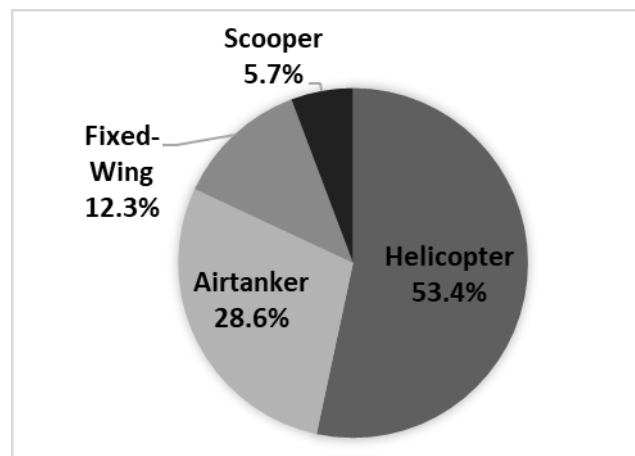
Pay Code Description	Total Costs
Availability	\$264,271,836
Flight Time	\$112,066,565
Standby/Extended Standby	\$6,163,990
Other	\$10,192,552
Total	\$392,694,943



Helicopters represented the bulk of expenditures at \$209.5 million, or 53.4% of total. Large airtanker costs were just over a quarter of total (\$112.3 million, 28.6%), followed by fixed-wing (\$48.2 million, 12.3%) and scoopers (\$22.6 million, 5.7%; Figure 5).

Figure 5 – CY 2019 Aviation Contract Costs by Aircraft Type

Aircraft Type	Total Costs
Helicopter	\$209,523,153
Airtanker	\$112,320,470
Fixed-Wing	\$48,281,247
Scooper	\$22,570,073
Total	\$392,694,943



Fixed-Wing Aircraft

In 2019, the Forest Service issued EXU contracts for 22 fixed-wing aircraft to support various missions for smokejumper, leadplane, air attack, and transportation of firefighters. 137 additional fixed-wing aircraft were available for use on CWN contracts (Table 3).

Table 3 – CY 2019 Contract Fixed-Wing Fleet Summary

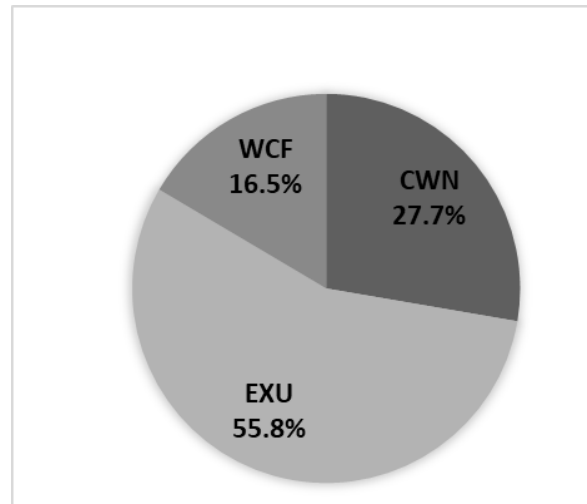
Aircraft Category	EXU Aircraft	CWN Aircraft
Smokejumper Aircraft	5	0
Aerial Supervision Modules/ Leadplanes	15	0
Light Fixed-Wing	22	75 ⁴
Transport Jet	1	1
Other Regional Light Fixed-Wing	0	61 ⁴
Totals	43	137

In addition to the contract aircraft, the Forest owns and operates 19 light-fixed-wing aircraft utilized for smokejumper, leadplane, and other natural resource management missions, such as Forest Health Protection. In 2019, fixed-wing aircraft flew 17,827 hours, which accounts for 41.9% of the annual total flight time. Over half of the fixed-wing flight time is from Exclusive Use (EXU) aircraft (55.8%), 27.7% is from Call When Needed (CWN) planes, and 16.5% is from Agency owned (WCF) fixed-wing aircraft (Figure 6).

⁴ Value is approximated based on 2018 report numbers. CWN light fixed-wing aircraft that may be utilized for ATGS missions as needed are managed under Regional contracts for various non-fire missions.

Figure 6 – CY 2019 Total Fixed-Wing Flight Time by Contract Type

Contract Type	Flight Hours
Call When Needed (CWN)	4,937
Exclusive Use (EXU)	9,945
Agency Owned (WCF)	2,944
Total	17,827



Most fixed-wing flight time was spent supporting air attack missions (36.9%). The remaining fixed wing flight hours are well distributed among a variety of missions, described in Table 4.

Table 4 – CY 2019 Total Fixed-Wing Flight Time by Mission Code Description

Mission Code Description	Flight Hours	Percent of Total
Air Attack	6,578	36.9%
Detection (Flights for detecting wildfires)	1,889	10.6%
Survey/Observation	1,349	7.6%
Smokejumper Transport	1,335	7.5%
Leadplane	1,068	6.0%
Lead Plane (Aerial Supervision Module)	954	5.3%
Personnel Transport, Normal Activities	888	5.0%
Ferry	751	4.2%
Infrared Imagery, fire suppression	736	4.1%
Other	2,279	12.8%
Total	29,635	100%

Fixed-wing expenditures were \$51.8 million in 2019 (Table 5). Total flight time (17,827 hours), flight costs (\$26.0 million) and total costs (\$51.8 million) were all below the 5-year average values, but availability costs (\$25.7 million) exceeded the 5-year year average value (Table 5).

Table 5 – CY 2015-2019 Total Fixed-Wing Costs by Pay Code Description

Calendar Year	Flight Hours	Availability Costs (Millions USD)	Flight and Other Costs - (Millions USD)	Total Costs (Millions USD)
2015	25,339	\$18.3	\$41.9	\$60.1
2016	22,774	\$20.1	\$40.2	\$60.3
2017	27,078	\$21.2	\$46.3	\$67.7
2018	24,522	\$24.0	\$45.6	\$69.6
2019	17,827	\$25.7	\$26.0	\$51.8
5-year average	23,508	\$21.9	\$40.0	\$61.9

Smokejumper Program

2019 was a notable year for the National Smokejumper program. Four Sherpa SD3-60 aircraft were phased in, and 205 smokejumpers are currently transitioned to the Ram-Air system (69% of the program). 294 smokejumpers were in the program at 7 established bases in 2019. Smokejumpers utilized 14 aircraft to staff 122 fires by parachute. They made 604 fire jumps and spent 7,612 days on fire assignments. In addition, the program delivered 32,148 pounds of para cargo (Table 6).

Table 6 – CY 2019 Smokejumper Program Summary

Smokejumper Base	Region	Aircraft Make Model/ Vendor	SMJs Per Base	Fires Staffed by SMJs	Fire Jumps	Days on Fires
Missoula	R1	(1) Sherpa A Model/USFS (1) Sherpa SD3-60/USFS (1) DHC-6 Twin Otter/Leading Edge	70	9	69	3,576
Grangeville	R1	(1) DHC-6 Twin Otter/Leading Edge	28	16	82	289
West Yellowstone	R1	(1) Dornier 228/Bighorn	32	7	46	573
McCall	R4	(2) DHC-6 Twin Otter/USFS	59	17	116	737
Redding	R5	(1) Sherpa A Model/USFS (1) Sherpa SD3-60/USFS (1) Dornier 228/Bighorn	32	25	101	467
North Cascades	R6	(1) CASA 212/Bighorn	25	11	43	567
Redmond	R6	(1) Sherpa A Model/USFS (2) Sherpa SD3-60/USFS	48	37	147	1,403
		14 Aircraft	294	122	604	7,612

Helicopters

The Agency awarded 102 EXU and 310 CWN contracts in 2019 (Table 7). Of these, the Agency utilized 245 contracted helicopters on fire and natural resource management missions. The actual number of aircraft in operation differs from Table 7 values due to dual contract awards (both EXU and CWN for a single aircraft), vendor aircraft substitutions, or CWN aircraft unavailability.

Table 7 – CY 2019 Contract Helicopter Fleet Summary

Helicopter Category	EXU Aircraft	CWN Aircraft ⁵	Total
Type 1	28	34	62
Type 2	34	22	56
Type 3	40	254 ⁶	294
Total	102	310	412

⁵ These totals represent the number of aircraft awarded a line item on the CWN contract and are not representative of the number of aircraft that had orders for operational missions. Some of the T3 helicopters are double counted since they are awarded both EXU and CWN contracts.

⁶ This number represents the total aircraft awarded a line item. 87 T3 CWN helicopters operated for the FS in 2019.

In total, there were 20,579 flight hours for helicopters in 2019. For chemical and water delivery missions, approximately 40.9 million gallons of water and 200 thousand gallons of retardant were delivered (Table 8).

Table 8 – CY 2019 Helicopter Use Summary by Contract and Helicopter Type

Helicopter Type	Flight Hours	All Liquids (gallons)	Water (gallons)	Retardant (gallons)	Unknown Liquid (gallons)
Exclusive Use Helicopters					
Type 1	4,452	29,117,067	28,916,766	200,301	0
Type 2	5,350	4,591,083	4,562,203	0	28,880
Type 3	7,210	1,794,405	1,790,423	0	3,982
EXU Subtotal	17,013	35,502,555	35,269,392	200,301	32,862
Call When Needed Helicopters					
Type 1	944	4,953,558	4,953,558	0	0
Type 2	340	445,589	441,509	0	4,080
Type 3	1,766	199,986	199,986	0	0
CWN Subtotal	3,051	5,599,133	5,595,053	0	4,080
Agency Owned Helicopters					
Type 3	515	0	0	0	0
Owned Subtotal	515	0	0	0	0
Total	20,579	41,101,688	40,864,445	200,301	36,942

Total flight time by helicopter type illustrates higher proportional use of T3 helicopters (46.1%) compared to previous years of record (Figure 7). For each helicopter category, EXU aircraft represented the bulk of recorded flight time (82.7%; Figure 8).

Figure 7 – CY 2019 Total Helicopter Flight Hours by Type

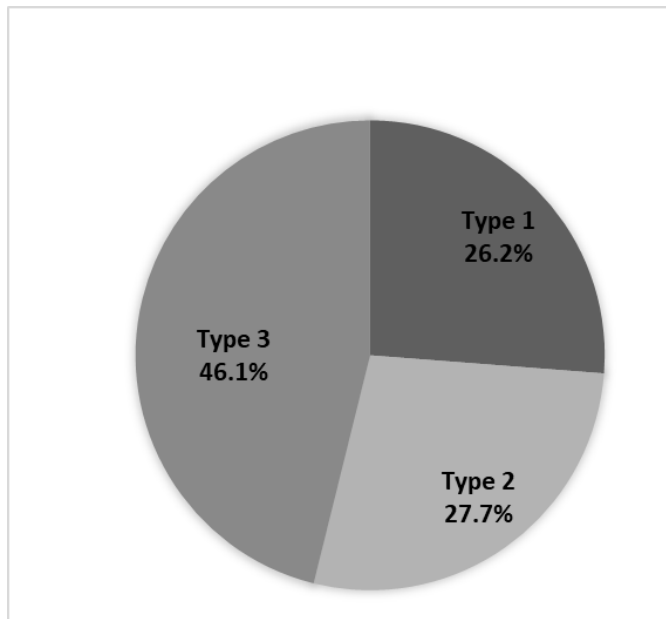
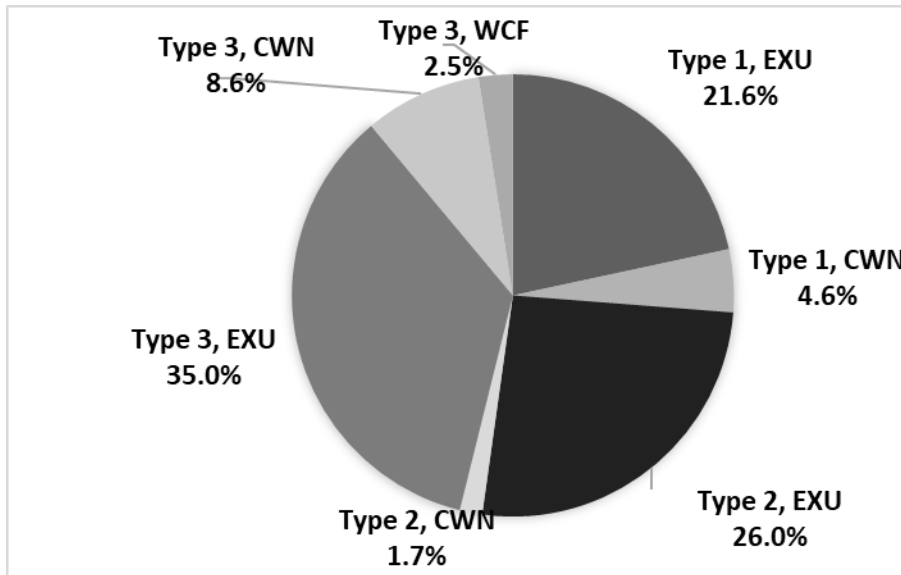


Figure 8 – CY 2019 Total Helicopter Flight Hours by Helicopter and Contract Type



Helicopter expenditures were \$209.5.0 million in CY 2019; approximately 70% went toward availability costs and 30% went toward flight and other charges. This annual total was almost \$100 million below the 5-year average (Table 9).

Table 9 – CY 2015-2019 Contract Helicopter Use and Costs Summary

Calendar Year	Flight Hours	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
2015	32,946	\$162.7	\$102.1	\$264.7
2016	34,371	\$173.6	\$208.4	\$382.0
2017	43,981	\$200.2	\$144.5	\$344.7
2018	39,892	\$198.0	\$141.0	\$339.0
2019	20,588	\$145.2	\$64.3	\$209.5
5-yr avg.	34,356	\$175.9	\$132.1	\$308.0

T1 helicopter costs in 2019 were also below the 5-year average at \$125.6 million, and a similar proportion of total costs went toward availability (71.6%; Table 10).

Table 10 – CY 2015-2019 Contract Type 1 Helicopter Use and Costs Summary

Calendar Year	Flight Hours	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
2015	10,698	\$101.1	\$62.9	\$164.0
2016	13,168	\$107.5	\$70.6	\$178.2
2017	15,981	\$126.7	\$90.9	\$217.7
2018	15,914	\$131.9	\$93.8	\$225.6
2019	5,397	\$89.9	\$35.6	\$125.6
5-yr avg.	12,232	\$111.4	\$70.8	\$182.2

T2 helicopter costs were also below average in 2019, and total annual T2 expenditures were \$48.5 million. Of this, \$34.2 million (66.7%) went to availability (Table 11).

Table 11 – CY 2015-2019 Contract Type 2 Helicopter Use and Costs Summary

Calendar Year	Flight Hours	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
2015	9,913	\$38.1	\$12.9	\$59.9
2016	10,061	\$44.5	\$121.1	\$165.6
2017	13,429	\$46.0	\$31.3	\$77.4
2018	10,198	\$39.5	\$25.3	\$64.8
2019	5,690	\$34.2	\$14.3	\$48.5
5-yr avg.	9,858	\$40.5	\$41.0	\$83.2

T3 helicopter costs were below the 5-year average in 2019, but the deviation from average was not as extreme as for T1 and T2 helicopters. Annual total T3 expenditures were \$35.5 million compared to \$42.4 million for the 5-year average. Availability costs were proportionally lowest for T3 helicopters, at \$21.1 million, or 59.3% of total 2019 T3 expenditures (Table 12).

Table 12 – CY 2015-2019 Contract Type 3 Helicopter Use and Costs Summary

Calendar Year	Flight Hours	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
2015	11,749	\$23.5	\$17.1	\$40.6
2016	11,142	\$21.5	\$16.7	\$38.2
2017	14,572	\$27.0	\$22.2	\$49.2
2018	13,780	\$26.7	\$21.9	\$48.5
2019	9,501	\$21.1	\$14.4	\$35.5
5-yr avg.	12,149	\$24.0	\$18.5	\$42.4

Rappel Program

In 2019, the USFS Rappel Program had 15 aircraft across 12 bases in 4 Regions, staffed by 266 rappellers. Rappellers supported 151 IA fires by rappel and 140 IA fires by helitack. Additionally, 82 large fires were supported by rappel crews. Aircraft on rappel missions flew 2,505 flight hours in 2019 (Table 13).

Table 13 – CY 2019 Rappel Program Use Summary

Base	Region	Aircraft	Rappellers	Fires (Rappel)	Fires (Helitack)	Large Fires Supported	Flight Time
Gallatin	R1	33HX	15	0	8	9	142
Libby	R1	37HX	16	9	3	5	105
Lucky Peak	R4	85PP	10	3	12	8	151
Salmon 1	R4	933CH	17	22	23	4	216
Salmon 2	R4	205LM	17	13	4	11	254
Price Valley 1	R4	669H	15	10	9	5	179
Price Valley 2	R4	679H	15	7	6	4	151
Scott Valley	R5	502HQ	16	4	24	5	150
Trimmer	R5	C-FHQB	15	5	29	11	202
La Grande 1	R6	223HT	19	8	6	4	189
La Grande 2	R6	404HA	19	16	10	1	137
Wenatchee	R6	205RH	25	11	5	3	161
John Day	R6	689H	25	12	1	6	218
Siskiyou	R6	28HX	19	14	0	3	109
Central OR	R6	205DY	23	17	0	3	141
			266	151	140	82	2,505
				291 IA Fires Staffed			

Airtankers

In 2019, the Forest Service had 35 airtankers available under Exclusive Use and Call When Needed contracts, including 13 VLATs and LATs on EXU contracts, 22 VLATs and LATs on CWN contracts, and 4 multi-engine water scoopers on CWN contracts (Table 14). Up to 8 MAFFS units were available for surge capacity needs.

Table 14 – CY 2019 Airtanker Fleet Summary

Aircraft Category	EXU Aircraft	CWN Aircraft
Large and Very Large Airtankers	13	22
Water Scoopers	0	4
MAFFS	0	8

Contract airtankers logged 3,310 flight hours in 2019, which represents 7.8% of the Agency's total calendar year use billed in ABS. Contract airtankers also delivered approximately 13.2 million gallons of retardant, with 68.9% of total delivered by LATs and 30.8% by VLATs (Table 15).

Table 15 – CY 2019 Airtanker Use Summary by Aircraft and Contract Type

Airtanker Type	Flight Hours	Retardant (gallons)
Exclusive Use		
VLAT	486	3,768,052
LAT	2,146	7,081,902
SEAT	57	43,205
EXU Subtotal	2,689	10,893,159
Call When Needed		
VLAT	51	316,319
LAT	570	2,047,461
CWN Subtotal	621	2,363,780
Total Airtanker Use	3,310	13,256,939

46.8% of use by flight time was in support of Forest Service fires (derived from ABS job code); the remaining 53.2% of use on non-Agency fires went to state and local cooperators (29.6%) and the Department of Interior (23.2%; Table 16).

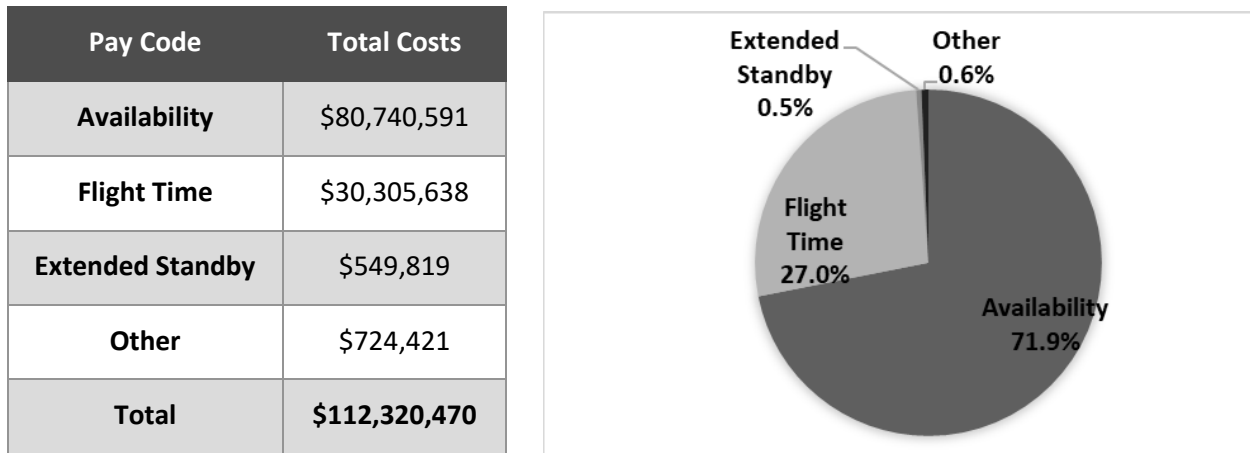
Table 16 – CY 2019 Airtanker Flight Time by Region/Agency⁷

Region/Agency	Flight Hours	Percent of Flight Hours
FS: Region 1	120	3.4%
FS: Region 2	71	2.0%
FS: Region 3	553	15.9%
FS: Region 4	153	4.4%
FS: Region 5	469	13.4%
FS: Region 6	184	5.3%
FS: Region 8	19	0.6%
FS: Region 9	0	0.0%
FS: Region 10	21	0.6%
FS: Region 13 (WO)	44	1.3%
FS Total	1,632	46.8%
BIA	100	2.9%
BLM	657	18.9%
FWS	28	0.8%
NPS	23	0.7%
DOI Total	808	23.2%
Non-Fed Fire (State)	1,032	29.6%
Non-Wildland Fed Fire (DoD)	12	0.3%
Grand Total	3,485	100.0%

Contract LAT/VLAT expenditures were \$112.3 million in CY 2019. Availability charges totaled \$80.7 million (71.9%), and flight time costs were \$30.3 million (27.0%). Standby and other expenses accounted for the remaining costs (\$1.3 million, 1.1%; Figure 9). All LAT/VLAT expenditures (not including scoopers) represented 28.6% of total Agency aircraft expenditures billed in ABS.

⁷ Region/Agency derived from Incident Finance Job Codes from ABS data.

Figure 9 – CY 2019 Contract LAT/VLAT Costs by Pay Code Description



For EXU airtankers, by aircraft model, RJ85 aircraft flew the most in 2019 (1,015 hours), followed next by BAE 146 aircraft (672 hours), DC-10 aircraft (461 hours) and MD-87 aircraft (431 hours). RJ85 aircraft also represented the highest availability cost (\$24.7 million). DC-10 aircraft delivered the most retardant (3.8 million gallons; Table 17).

Table 17 – CY 2019 EXU Contract LAT/VLAT Use Summary by Aircraft Model

Aircraft Model	Flight Hours	Retardant (gallons)	Availability Costs
BAE 146	672	1,982,682	\$16,967,130
RJ85	1,015	3,047,718	\$24,657,837
DC-10	491	3,768,052	\$10,681,032
MD-87	431	1,466,427	\$10,876,844
EC130Q	156	585,075	\$4,165,774
Total	2,822	10,893,159	\$67,556,867

Tables 18-21 summarize historical airtanker use by year, aircraft type, and contract category. These summaries do not include Modular Airborne Fire Fighting Systems (MAFFS) or cooperator airtanker use data. 2019 EXU LAT total flight time (2,273 hours) and gallons delivered (7.1 million gallons) were the lowest annual totals in the past five years (Table 18). EXU VLATs flew 491 hours, which is near the 5-year average, and delivered an additional 3.8 million gallons of retardant (Table 19).

Table 18 – CY 2015-2019 EXU LAT Use Summary

Calendar Year	Flight Hours	Retardant (gallons)
2015	2,960	8,505,338
2016	3,842	13,413,889
2017	6,156	25,711,954
2018	4,021	12,976,364
2019	2,273	7,081,902
5-yr average	3,851	13,499,397

Table 19 – CY 2015-2019 EXU VLAT Use Summary

Calendar Year	Flight Hours	Retardant (gallons)
2015	243	2,206,558
2016	484	4,698,349
2017	673	6,670,145
2018	678	5,178,692
2019	491	3,768,052
5-yr average	514	4,504,359

CWN airtankers saw moderated use in 2019, corresponding to low fire activity and related demand. CWN LATs flew 608 hours and delivered 2.0 million gallons of retardant, both near 5-year average values (Table 20). CWN VLATs flew just 55 hours and delivered 317 thousand gallons of retardant (Table 21).

Table 20 – CY 2015-2019 CWN LAT Use Summary

Calendar Year	Flight Hours	Retardant (gallons)
2015	890	3,129,859
2016	414	1,662,021
2017	395	1,658,126
2018	1,196	4,194,568
2019	608	2,047,461
5-yr average	701	2,537,207

Table 21 – CY 2015-2019 CWN VLAT Use Summary

Calendar Year	Flight Hours	Retardant (gallons)
2015	273	2,517,189
2016	52	595,995
2017	199	1,991,424
2018	291	1,970,183
2019	55	316,319
5-yr average	174	1,478,222

MAFFS

The Forest Service utilizes military C-130 aircraft with a Modular Airborne Fire Fighting System (MAFFS) to support surge capacity mission needs. The totals represented in the summary tables shown are not included elsewhere in this report because MAFFS aircraft do not report their flight hours into ABS for payment. There were no MAFFS activations for fire support in 2019, but there were 88 flight hours and \$961 thousand in certification costs associated with training exercises (Table 23).

Table 22 – CY 2015-2019 MAFFS Summary of Activation on Fires

Calendar Year	Flight Hours	Retardant (gallons)	Total Costs
2015	424	980,246	\$4,916,994
2016	144	411,774	\$2,416,374
2017	95	Unavailable	\$4,031,517
2018	Unavailable	Unavailable	\$2,034,281
2019	0	0	0
5-Year Average	Unavailable	Unavailable	\$2,679,833

Table 23 – CY 2015-2019 MAFFS Total Use Summary

Calendar Year	Flight Hours	Total Costs
2015	454	\$6,740,844
2016	216	\$5,661,562
2017	252	\$6,373,360
2018	Unavailable	\$3,971,495
2019	88	\$960,953
5-Year Average	Unavailable	\$4,741,643

Table 24 – CY 2015-2019 MAFFS Costs by Charge Category

Calendar Year	Certification Costs	Fire Activation Costs	Total Costs
2015	\$1,823,850	\$4,916,994	\$6,740,844
2016	\$3,245,188	\$2,416,374	\$5,661,562
2017	\$2,341,843	\$4,031,517	\$6,373,360
2018	\$1,937,214	\$2,034,281	\$3,971,495
2019	\$960,953	0	\$960,953
5-Year Average	\$2,061,810	\$2,679,833	\$4,741,643

Water Scoopers

The Forest Service contracted four multi-engine water scoopers on a CWN contract in 2019. The aircraft flew 679 hours, down from 2018 and below the 5-year average. Total costs in ABS were \$22.5 million, and the scoopers delivered 3.2 million gallons of water. \$12.5 million, or 55.6% of total costs were attributed to aircraft availability charges (Table 25).

Table 25 – CY 2015-2019 Scooper Use Summary

Calendar Year	Flight Hours	Water Delivered (gallons)	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
2015	576	3,877,200	\$17.0	\$5.4	\$22.4
2016	1,168	6,089,600	\$25.8	\$15.6	\$41.4
2017	1,676	7,841,107	\$30.5	\$23.3	\$53.8
2018	1,609	8,795,257	\$27.8	\$23.0	\$50.8
2019	679	3,292,206	\$12.5	\$9.9	\$22.5
5-yr avg.	1,142	5,979,074	\$22.7	\$15.4	\$38.2

Agency-Owned Aircraft Summary

The Forest Service owned and operated 22 aircraft in 2019. Agency aircraft accounted for 3,315 (7.4%) of the 42,570 total flight hours billed in ABS in 2020 (Table 26).

Table 26 – CY 2019 Agency Aircraft Use Summary by Aircraft Make and Model

Registration #	Make	Model	Flight Hours
N106FS	DEHAVILLAND	DHC-2 BEAVER	84
N106Z	BELL	206A	46
N107Z	BELL	209 COBRA	227
N109Z	BELL	209 COBRA	242
N111Z	CESSNA	206 STATIONAIR-6	96
N114Z	SHORT	SD3-60 SHERPA	76
N125Z	QUEST	KODIAK 100	257
N141Z	DEHAVILLAND	DHC-6-300	131
N142Z	DOUGLAS	DC-3 TURBINE	165
N143Z	DEHAVILLAND	DHC-6-300	165
N144Z	CESSNA	CITATION I 500	17
N145Z	SHORT	SD3-60 SHERPA	106
N147Z	BEECH	B200GT	298
N148Z	SHORT	SD3-60 SHERPA	8
N149Z	BEECH	KING AIR 200	505
N160Z	QUEST	KODIAK 100	233
N161Z	SHORT	SD3-60 SHERPA	90
N166Z	CESSNA	206 STATIONAIR-6	144
N175Z	SHORT	SD3-60	62
N178Z	SHORT	SD3-60	28
N179Z	SHORT	SD3-60	35
N182Z	BEECH	KING AIR 200	120
Total			3,315

5-year Aviation Summary Trends and Averages

2019 total flight time was down for all aircraft types in 2019, well below the 5-year average values (Table 27). These numbers reflect the below average fire season demands.

Table 27 – CY 2015-2019 Flight Hours by Aircraft Type

Calendar Year	Fixed-Wing	Helicopter	Airtanker	Scooper	Total
2015	25,339	32,957	4,369	576	68,137
2016	22,774	34,416	5,110	1,168	67,702
2017	30,382	44,375	6,750	1,676	83,184
2018	27,768	40,589	6,264	1,609	76,230
2019	17,827	20,579	3,485	679	42,570
5-Yr Avg.	24,818	34,583	5,196	1,142	67,565

Total passengers and cargo transported from all aircraft in 2019 were below the 5-year averages. There are no discernable trends in either category from the past five years (Table 28).

Table 28 – CY 2015-2019 Passenger and Cargo Summary (All Aircraft)

Calendar Year	Flight Hours	# of Passengers	Cargo Weight (lbs.)
2014	68,137	93,630	16,294,902
2015	67,702	75,422	10,711,562
2016	83,184	86,175	12,707,407
2017	76,230	79,926	16,308,212
2018	42,570	72,295	12,814,010
5-Yr Avg.	67,565	81,490	13,767,219

Total retardant delivery was also well below the 5-year average at 13.5 million gallons, compared to 23.1 million gallons. There is no discernible trend in retardant delivery totals from the last five years (Table 29).

Table 29 – CY 2015-2019 Total Retardant Delivered (All Aircraft)

Calendar Year	Retardant (gallons)
2015	17,829,660
2016	23,554,633
2017	33,515,515
2018	27,282,194
2019	13,515,907
5-Yr Avg.	23,139,582

Total costs in 2019 were also very low compared to the past five years. Totals for availability (\$264.3 million) and flight time (including other costs; \$133.3 million) were below the previous five years and the 5-year average (Table 30).

Table 30 – CY 2015-2019 Total Contract Aviation Costs⁸

Calendar Year	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
2015	\$283.5	\$185.1	\$468.6
2016	\$293.8	\$197.1	\$490.9
2017	\$349.2	\$270.7	\$619.9
2018	\$344.9	\$262.1	\$607.0
2019	\$264.3	\$133.3	\$397.5
5-Yr Avg.	\$307.1	\$209.7	\$516.8

⁸ Total contract cost is derived from ABS. Total availability cost includes non-availability.