

2021

# Aviation Annual Report



Aviation Annual Report

U.S. Forest Service

6/3/2022

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## Executive Summary

This report summarizes U.S. Department of Agriculture's (USDA) 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 the fire year 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.

Fire year 2021 was an extremely demanding year. Consequently, Forest Service agency-owned and contracted aircraft flew 81,487 hours in 2021, which was above the 5-year average and only 2.2 percent less than the previous high in recent years occurring in 2020.

Table 1 summarizes the utilization of the agency's fleet. These numbers are the actual number of aircraft utilized in 2021 and are not reflective of the number of contract line items per contract type. Actual number of contract line items may vary as some Exclusive Use aircraft are also awarded and utilized on CWN contracts, aircraft may be substituted during contract periods for maintenance, or Call When Needed (CWN) aircraft may not have been available at the time of a resource order.

The Airworthiness Branch inspected and issued cards to a total of 633 aircraft with 583 awarded USDA Forest Service contracts and 50 under U.S. Department of Interior contracts. The Pilot Standards Branch issued in excess of 1,500 USDA Forest Service and U.S. Department of Interior interagency contract pilot approvals.

## Report Disclaimer

Incident Business System (IBS) archived aircraft use and cost 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 IBS (e.g., military aircraft with MAFFS units). Missing data and data entry errors may persist in the archived data and subsequent analyses. IBS is an agency invoicing tool and was not designed for historical analyses. The Forest Service updates IBS 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 2021 Forest Service Aircraft Fleet Summary**

	<b>Number of Aircraft</b>
<b>Helicopters</b>	
<b>Exclusive Use (EXU)</b>	87
<b>Call When Needed (CWN)</b>	204
<b>Agency Owned – WCF</b>	3
<b>Airtankers</b>	
<b>Next Generation – EXU</b>	24
<b>Next Generation – CWN</b>	6
<b>MAFFS</b>	8
<b>Multi-Engine Water Scoopers</b>	
<b>Call When Needed (CWN)</b>	8
<b>Fixed-Wing</b>	
<b>Aerial Supervision Module / Leadplane (Lease)</b>	17
<b>Light Fixed-Wing – EXU</b>	29
<b>Light Fixed-Wing – CWN</b>	92
<b>Smokejumper Aircraft – EXU</b>	8
<b>Smokejumper Aircraft – CWN</b>	0
<b>Large Transport – EXU</b>	2
<b>Agency Owned Fixed-Wing – WCF</b>	22

## 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 2021, 449 contracted aircraft and 25 agency-owned aircraft were utilized to meet agency missions.<sup>1</sup>

This report categorizes aircraft into six groups: fixed-wing, helicopter, airtanker, scooper, Modular Airborne Fire Fighting Systems (MAFFS), and unmanned/uncrewed aircraft systems (UAS). The data summaries include both agency-owned and contract aircraft, unless otherwise noted. The overall data totals represented do not include MAFFS and UAS flight hours since these systems do not report flight hours in IBS or in the FAMWEB Data Warehouse. MAFFS and UAS summaries are only reflected in their respective sections. 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)), with an exception for MAFFS which are presented separately. Finally, scoopers are water scooping fixed-wing aircraft used in fire suppression.

### 2021 At-A-Glance

#### Aviation Use

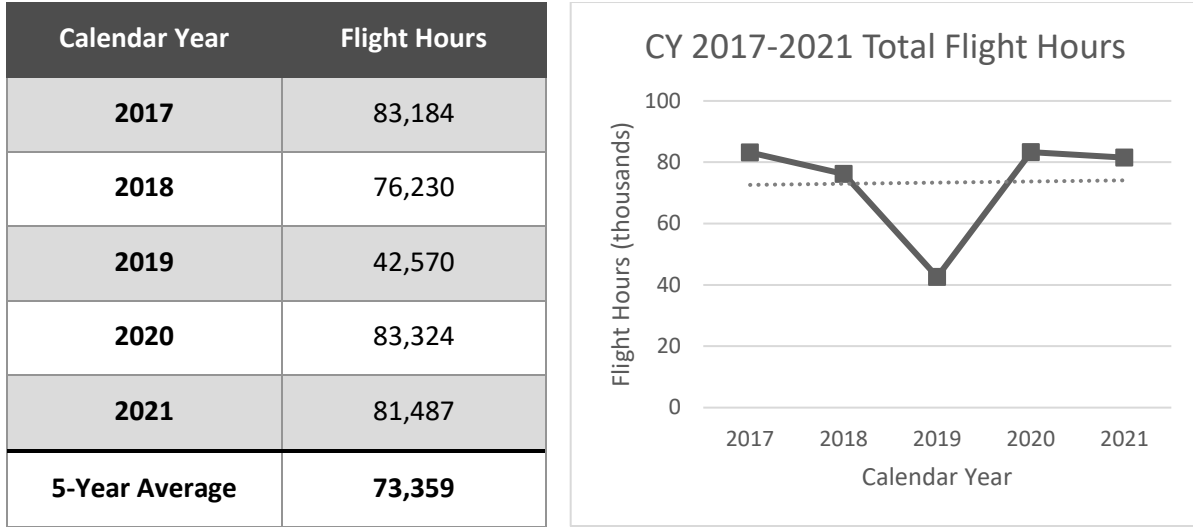
Agency and contract aircraft flew 81,487 hours in calendar year 2021 (Figure 1), which was above the 5-year average and only 2.2% less than the previous high in recent years occurring in 2020 (CY 2017-2021 average is 73,359 hours). Following a first in 2020, surge aircraft were again used in 2021 to supplement the Exclusive Use fleet and provide additional capability at a negotiated rate for airtankers, water scoopers, helicopters, and aerial supervision aircraft using modified agreements guaranteeing Mandatory Availability Periods (MAPs).

The high fire activity resulted in 87.4% of the 81,487 annual flight hours being in direct support of fire or prescribed fire, with only 2.9% for resource missions (non-fire), 2.0% for training/maintenance and 7.7% percent for ferry flight and various other missions. For the year, aircraft activity peaked in July and August, with 53% of all annual flight hours; however, there was sustained heavy flight time from June to September with monthly totals exceeding 10,000 hours (Figure 2).

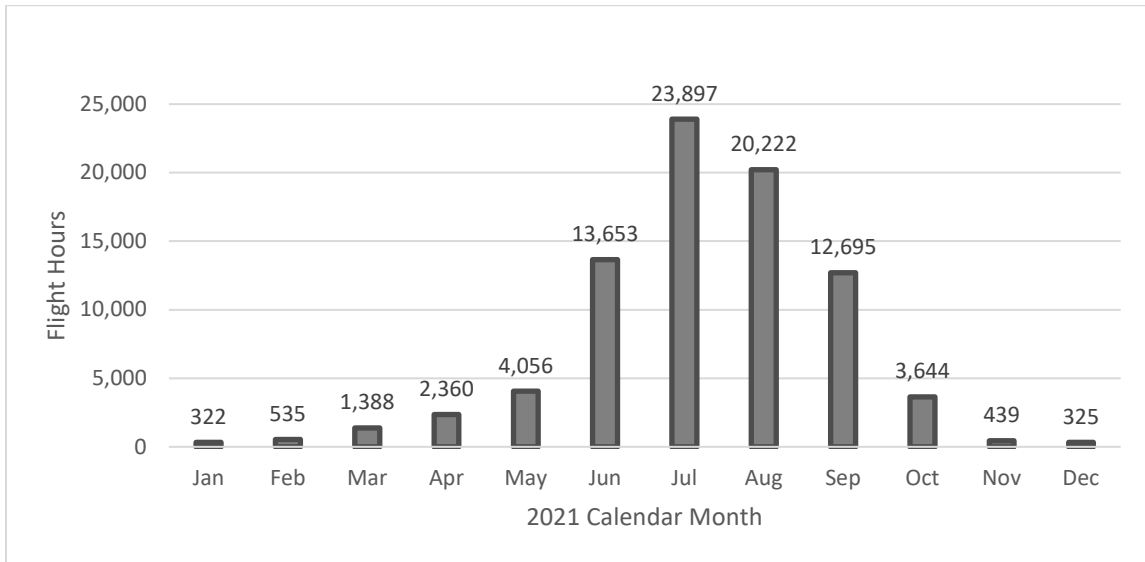
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<sup>1</sup> Values reflect the actual number of unique aircraft that operated and may not align with fleet size values due to contract processes (e.g., aircraft swaps, multiple contract awards).

**Figure 1 – CY 2017-2021 Total Agency Flight Time**



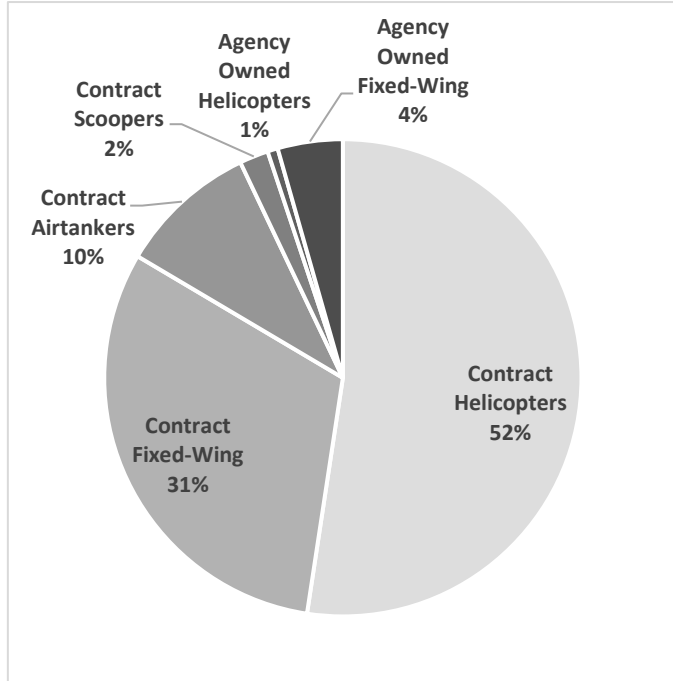
**Figure 2 – CY 2021 Total Agency Flight Time by Month**



Flight time for contract aircraft represented 94.8% of the annual total; agency flight hours accounted for the remaining 5.2% (Figure 3). Examination of the distribution of use by aircraft type and ownership demonstrates that contract helicopters (51.8%) and contract fixed-wing (29.8%) represented the largest proportion of use (Figure 3).

**Figure 3 – CY 2021 Total Agency Flight Time by Aircraft and Contract Type**

Aircraft Type	Flight Hours
Contract Helicopters	42,703
Contract Fixed-Wing	25,347
Contract Airtankers	7,678
Contract Scoopers	1,598
Agency-Owned Helicopters	569
Agency-Owned Fixed-Wing	3,592
<b>Total</b>	<b>81,487</b>





Flight hours in support of agency missions accounted for the bulk of flight time (71.9%), with 12.1% of flight hours attributed to Department of Interior missions, 13.3% to non-Federal missions, and <1% for missions related to other or unknown jurisdictions (Table 2). For USFS Regions, Region 5 lead the agency with both Regions 1 and 6 also exceeding 10,000 Flight Hours.

**Table 2 – CY 2021 Total Agency Flight Time by Region/Agency<sup>2</sup>**

Region/Agency	Flight Hours	Percent of Total Flight Hours
<b>FS: Region 1</b>	11,349	13.9%
<b>FS: Region 2</b>	2,095	2.6%
<b>FS: Region 3</b>	5,708	7.0%
<b>FS: Region 4</b>	6,584	8.1%
<b>FS: Region 5</b>	16,106	19.8%
<b>FS: Region 6</b>	10,522	12.9%
<b>FS: Region 8</b>	1,872	2.3%
<b>FS: Region 9</b>	2,738	3.4%
<b>FS: Region 10</b>	537	0.7%
<b>FS: Region 13 (WO)</b>	2,265	2.8%
<b>FS: Region Other (Research Stations, CIO, etc.)</b>	292	0.3%
<b>FS Total</b>	<b>60,069</b>	<b>71.9%</b>
<b>BIA</b>	4,062	4.9%
<b>BLM</b>	4,518	5.4%
<b>FWS</b>	9	<0.1%
<b>NPS</b>	1,542	1.8%
<b>DOI Total</b>	<b>10,132</b>	<b>12.1%</b>
<b>Non-Fed Fire (State)</b>	<b>11,145</b>	<b>13.3%</b>
<b>Other</b>	<b>140</b>	<b>&lt;1%</b>
<b>Grand Total</b>	<b>81,487</b>	<b>100%</b>

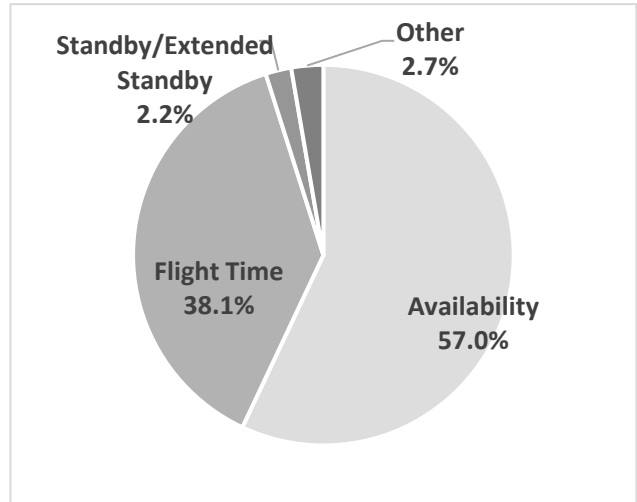
<sup>2</sup> Region/Agency derived from Incident Finance Job Codes from IBS data.

## Aviation Costs

In CY 2021, agency expenditures for contract aircraft totaled \$751.5 million. More than half of all charges went to availability pay codes (57%). 38.1% went to flight time costs; remaining expenses were attributed to standby/extended standby (2.2%) and other pay codes (2.7%; Figure 4).

**Figure 4 – CY 2021 Aviation Contract Costs by Pay Code Description**

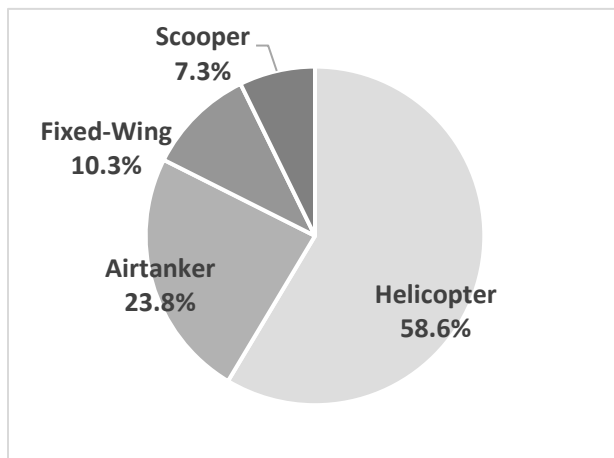
Pay Code Description	Total Costs
Availability	\$428,377,330
Flight Time	\$286,261,440
Standby/Extended Standby	\$16,454,132
Other	\$20,404,097
<b>Total</b>	<b>\$751,497,000</b>



Helicopters represented the bulk of expenditures at \$440.5 million, or 58.6% of total. Airtanker costs were roughly a quarter of the total (\$179.1 million, 23.8%), followed by fixed-wing (\$77.7 million, 10.3%) and scoopers (\$54.5 million, 7.3%; Figure 5).

**Figure 5 – CY 2021 Aviation Contract Costs by Aircraft Type**

Aircraft Type	Total Costs
Helicopter	\$440,476,658
Airtanker	\$179,086,003
Fixed-Wing	\$77,701,335
Scooper	\$54,511,548
<b>Total</b>	<b>\$751,497,000</b>



## Fixed-Wing Aircraft

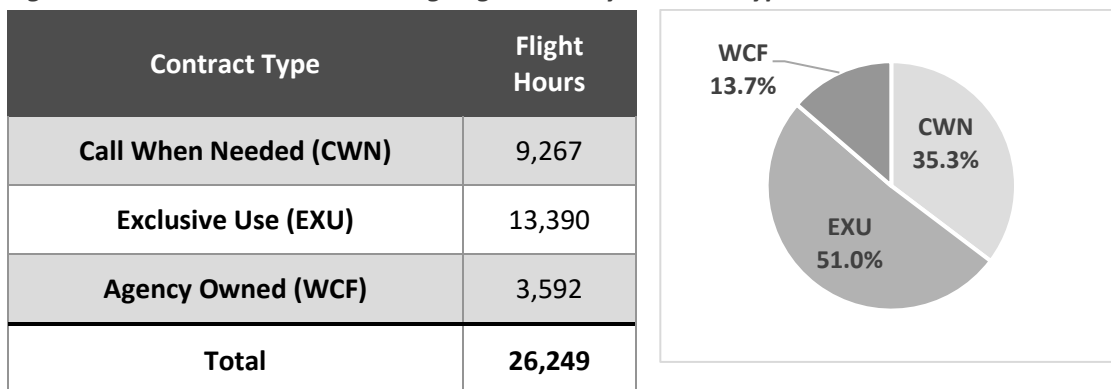
In 2021, the Forest Service utilized EXU contracts for 54 fixed-wing aircraft to support various missions for smokejumper, leadplane, air attack, and transportation of firefighters. Approximately 92 additional fixed-wing aircraft were activated for use on CWN contracts. In addition to the contract aircraft, the Forest owns and operates 22 light-fixed-wing aircraft utilized for smokejumper, leadplane, and other natural resource management missions, such as Forest Health Protection (Table 3).

**Table 3 – CY 2021 Fixed-Wing Fleet Summary**

Aircraft Category	EXU Aircraft	CWN Aircraft	WCF Aircraft
<b>Smokejumper Aircraft</b>	8	0	11
<b>Aerial Supervision Modules/ Leadplanes</b>	17	0	1
<b>Light Fixed-Wing</b>	27	92	10
<b>Transport Jet</b>	2	0	0
<b>Total</b>	<b>54</b>	<b>92</b>	<b>22</b>

In 2021, fixed-wing aircraft flew 26,948 hours, which accounts for 32.2% of the annual total flight time. Half of the fixed-wing flight time is from Exclusive Use (EXU) aircraft (50.1%), 36.5% is from Call When Needed (CWN) planes, and 13.3% is from agency-owned (WCF) fixed-wing aircraft (Figure 6).

**Figure 6 – CY 2021 Total Fixed-Wing Flight Time by Contract Type**



More than half of all fixed-wing flight time (52.5%) was spent supporting air attack missions in 2021. Lead plane (2,353 hours; 9.0%), infrared flight time (1,788 hours; 6.8%), and detection (1,724 hours; 6.6%) were the next highest mission codes billed for the year in IBS (Table 4).

**Table 4 – CY 2021 Total Fixed-Wing Flight Time by Mission Code Description**

<b>Mission Code Description</b>	<b>Flight Hours</b>	<b>Percent of Total</b>
<b>Air Attack</b>	13,768	52.5%
<b>Infrared Imagery, fire suppression</b>	1,788	6.8%
<b>Lead Plane</b>	2,353	9.0%
<b>Lead Plane (Aerial Supervision Module)</b>	1,001	3.8%
<b>Detection (Flights for detecting wildfires)</b>	1,724	6.6%
<b>Smokejumper Operations</b>	1,339	5.1%
<b>Ferry</b>	786	3.0%
<b>Pilot Training</b>	890	3.4%
<b>Other</b>	2,600	9.9%
<b>Total</b>	<b>26,249</b>	<b>100%</b>

Fixed-wing expenditures were \$82.6 million in 2021 (Table 5). 2021 annual flight totals and related costs were all above the 5-year averages.

**Table 5 – CY 2017-2021 Total Contract 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)
<b>2017</b>	27,078	\$21.2	\$46.3	\$67.7
<b>2018</b>	24,522	\$24.0	\$45.6	\$69.6
<b>2019</b>	17,827	\$25.7	\$26.0	\$51.8
<b>2020</b>	29,195	\$32.7	\$52.5	\$85.2
<b>2021</b>	26,249	\$32.8	\$45.1	\$77.9
<b>5-year average</b>	<b>24,974</b>	<b>\$27.3</b>	<b>\$43.1</b>	<b>\$70.4</b>

## Smokejumper Program

Smokejumpers utilized 15 aircraft to staff 200 fires by parachute, made 1,022 fire jumps; in addition, the program delivered 42,676 pounds of para cargo (Table 6). The smokejumper program delivered critical supplies to fires nationwide utilizing traditional para cargo and the Joint Precision Air Drop (JPAD) program.

The pandemic continued to affect operations in 2021. Most notably, boosting between bases was limited, and most trainings were limited to an individual base's personnel. Thirty-five new smokejumpers were trained, and 34 experienced smokejumpers were trained on the Ram-Air parachute. At the end of training season, there were 299 smokejumpers and 92% of those jumpers were utilizing the Ram-Air parachute system.

On May 24, 2021, Tim Hart was fatally injured during a parachute landing while staffing the Eicks Fire in New Mexico.

**Table 6 – CY 2021 Smokejumper Program Summary**

Smokejumper Base	Region	Aircraft Make Model/ Vendor	SMJs Per Base	Fires Staffed by SMJs	Fire Jumps
Missoula	R1	(2) Sherpa SD3-60/USFS (1) DHC-6 Twin Otter/Leading Edge	76	45	170
West Yellowstone	R1	(1) Dornier 228/Bighorn	27	21	120
Grangeville	R1	(1) DHC-6 Twin Otter/Leading Edge	27	13	79
McCall	R4	(2) DHC-6 Twin Otter/USFS (1) Sherpa SD3-60/USFS	65	43	246
Redding	R5	(1) Sherpa SD3-60/USFS (1) Dornier 228/Bighorn (1) CASA 212/Bighorn CWN	35	36	214
North Cascades	R6	(1) CASA 212/Bighorn	25	13	61
Redmond	R6	(2) Sherpa SD3-60/USFS (1) CASA 212/Bighorn CWN	44	29	132
		<b>15 Aircraft</b>	<b>299</b>	<b>200</b>	<b>1,022</b>

## Helicopters

Historically, the agency has had 28 - Type 1, 34 - Type 2, and approaching 50 - Type 3 helicopters on exclusive use contracts (EU). In 2021, the agency awarded 28 - Type 1 helicopter task orders through a competition amongst our Call When Needed (CWN) Agreement holders as substitute for the 28-Type 1 exclusive use helicopters that were not acquired due to the cancelled Type 1 Exclusive Use Helicopter Services acquisition. Twenty additional Type 1 helicopter task orders were awarded as well through the same competition enabling surge capacity. Two additional Type 3 helicopter task orders were competed via Type 3 CWN agreements to support the Aerial Supervision Program. Table 7 illustrates the agency utilized 295 contracted helicopters on fire and natural resource management missions. The Airworthiness Branch approved for use 401 helicopters (353 under USDA contracts and/or agreements and 43 under DOI contracts). The actual number of aircraft utilized in 2021 differs from the Table 7 values due to dual contract awards (both EU and CWN for a single aircraft), vendor aircraft substitutions, or CWN aircraft unavailability.

**Table 7 – CY 2021 Contract Helicopter Fleet Summary**

Helicopter Category	EU Aircraft	CWN Aircraft	Total
<b>Type 1</b>	0	100	100
<b>Type 2</b>	36	25	61
<b>Type 3</b>	51	79	130
<b>Total</b>	<b>78</b>	<b>217</b>	<b>295</b>

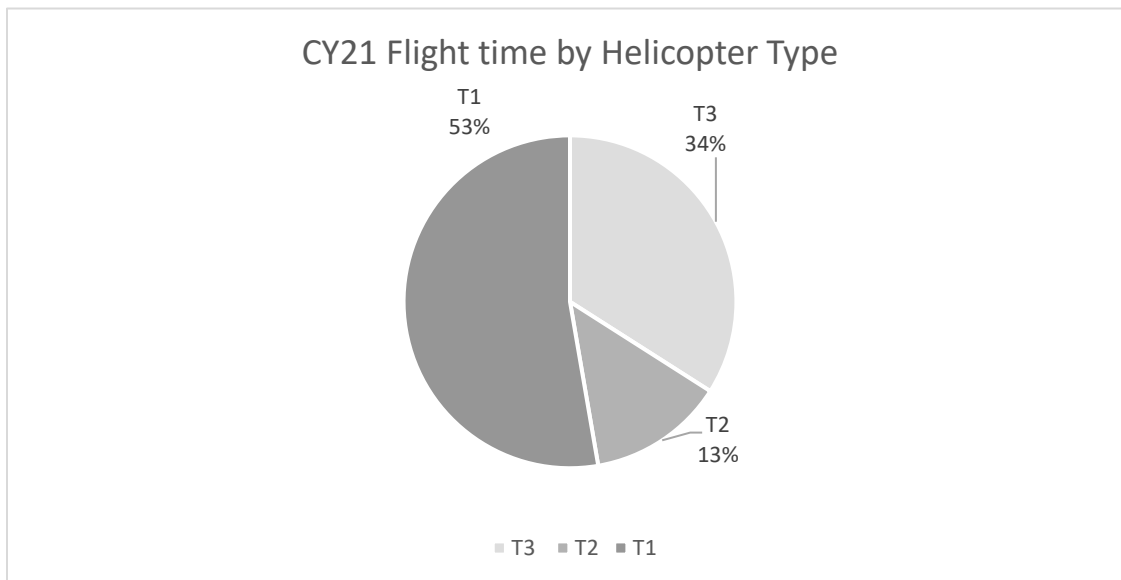
In total, there were 43,271.8 flight hours for helicopters in 2021. The volume of retardant and water delivered was 3,271,239 million and 111,773,078 million gallons respectively. There was also 2,846 gallons of gelled gasoline delivered during helitorch aerial ignition missions.

**Table 8 – CY 2021 Helicopter Use Summary by Contract and Helicopter Type**

Helicopter Type	Flight Hours	All Liquids (gallons)	Water (gallons)	Retardant (gallons)	Aerial Ignition Helitorch Gel (gallons)
<b>Exclusive Use Helicopters</b>					
<b>Type 1</b>	0	0	0	0	0
<b>Type 2</b>	5,358.9	5,683,317.2	5,682,699.2	618	0
<b>Type 3</b>	9,654.1	2,662,297.6	2,654,441.6	5,760	2,096
<b>EU Subtotal</b>	<b>15,013</b>	<b>8,345,614.8</b>	<b>8,337,140.8</b>	<b>6,378</b>	<b>2,096</b>
<b>Call When Needed Helicopters</b>					
<b>Type 1</b>	23,227.8	105,638,883	102,083,080.9	3,243,817	
<b>Type 2</b>	19.7	0	0	0	0
<b>Type 3</b>	4,442	1,374,651	572,194	21,044	750
<b>CWN Subtotal</b>	<b>27,689.7</b>	<b>107,013,533.9</b>	<b>103,435,937.9</b>	<b>3,264,861</b>	<b>750</b>
<b>Agency-Owned Helicopters</b>					
<b>Type 3</b>	569.1			0	0
<b>Owned Subtotal</b>	<b>569.1</b>			<b>0</b>	<b>0</b>
<b>Total</b>	<b>43,271.8</b>	<b>115,359,148.7</b>	<b>111,773,078.7</b>	<b>3,271,239</b>	<b>2,846</b>

Type 1 helicopters flew the greatest percentage of hours, 53%, across the helicopter types.

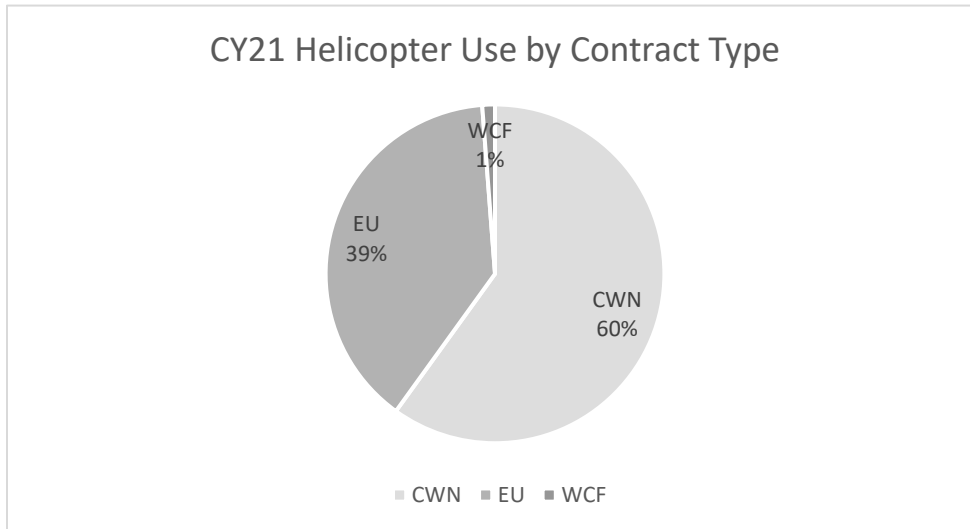
**Figure 7(a) – CY 2021 Total Helicopter Flight Hours by Type**





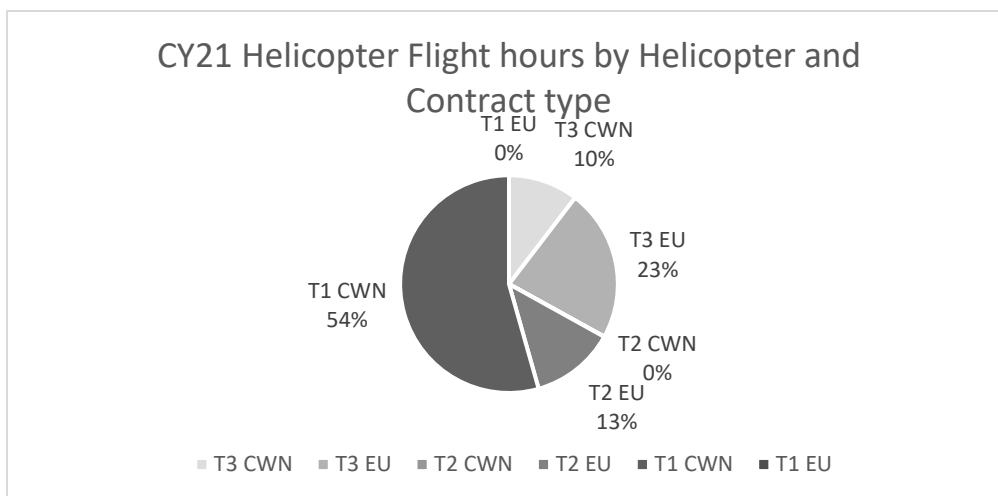
As expected CWN helicopters flew a higher percentage (60%) of hours than EU helicopters because there were no Type 1 EU contracts in place or awarded for 2021 and the 48 – Type 1 helicopters used were all CWN.

**Figure 7(b) – CY 2021 Total Helicopter Flight Hours by Contract Type**



For similar reasons, it was foreseeable that Type 1 CWN helicopters would proportionally have higher flight use than the other helicopters by type and by contract (54%). This higher percentage was also attributed to the additional 20 - Type 1 helicopters referenced earlier for the purpose of surge capacity aligned with the agency response to the COVID-19 pandemic. It is noteworthy that while these additional 20 surge helicopters were in demand, the helicopter program was not adequately staffed to manage this surge capacity and satisfy other common agency goals: reducing personnel exposure to risk, taking care of our people, and organizing for success.

**Figure 8 – CY 2021 Total Helicopter Flight Hours by Helicopter and Contract Type**



Total helicopter expenditures in CY 2021 were \$449.9 million which is 120% above the 5-year average of \$349.1 million (Table 9). A significant portion of this increase in costs can be attributed to the additional number of surge aircraft (20 - Type & 2 - Type 3 Surge) and that the total number of 48 - Type 1 helicopters were all CWN aircraft which have higher daily availability rates than EU aircraft.

**Table 9 – CY 2017-2021 Contract Helicopter Use and Costs Summary**

Calendar Year	Flight Hours	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
<b>2017</b>	43,981	\$200.2	\$144.5	\$344.7
<b>2018</b>	39,892	\$198.0	\$141.0	\$339.0
<b>2019</b>	20,588	\$145.2	\$64.3	\$209.5
<b>2020</b>	42,667	\$251.0	\$151.4	\$402.4
<b>2021</b>	43,272	\$265.5	\$184.3	\$449.9
<b>5-yr avg.</b>	<b>38,080</b>	<b>\$212.0</b>	<b>\$137.1</b>	<b>\$349.1</b>

For Type 1 helicopters, costs increased for similar reasons as the total costs. Type 1 expenditures (\$322.5 million) were 139% higher in 2021, compared to the 5-year average (\$232.7 million) (Table 10). \$186.3 million, or 57.8% of Type 1 costs were attributed to the expense of daily availability in 2021. The daily availability percentage of total costs is of nominal difference to the 5-year average, however the total costs for 2021 is 22% higher than the year nearest in total cost (2020).

**Table 10 – CY 2017-2021 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)
<b>2017</b>	15,981	\$126.7	\$90.9	\$217.7
<b>2018</b>	15,914	\$131.9	\$93.8	\$225.6
<b>2019</b>	5,397	\$89.9	\$35.6	\$125.6
<b>2020</b>	19,434	\$163.1	\$109.2	\$272.3
<b>2021</b>	23,228	\$186.3	\$136.2	\$322.5
<b>5-yr avg.</b>	<b>15,990.8</b>	<b>\$139.6</b>	<b>\$93.1</b>	<b>\$232.7</b>

T2 helicopter expenditures (\$64.8) were \$2.3 million below the 5-year average and total flight hours were 59% of the 5-year average (Table 11). This low percentage of flight hours may be indicative of underutilization of the Type 2 EU fleet due to hosting units and/or incidents limiting the response availability of these aircraft to other jurisdiction emerging or extended attack incidents.

**Table 11 – CY 2017-2021 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)
<b>2017</b>	13,429	\$46.0	\$31.3	\$77.4
<b>2018</b>	10,198	\$39.5	\$25.3	\$64.8
<b>2019</b>	5,690	\$34.2	\$14.3	\$48.5
<b>2020</b>	11,264	\$54.6	\$25.6	\$80.2
<b>2021</b>	5,378.62	\$40.9	\$23.9	\$64.8
<b>5-yr avg.</b>	<b>9,191.9</b>	<b>\$43.0</b>	<b>\$24.1</b>	<b>\$67.1</b>

2021 Type 3 helicopter costs (\$62.5 million) were above the 5-year average (\$49.1 million) by 127%. Total flight hours in 2021 exceeded the 5-year average by 110% and was the second highest in the last five years. Total Type 3 helicopter costs exceeded the next high year by \$12.6 million or 125% (Table 12). These flight hour values indicate good utilization of the Type 3 helicopter fleet and may be indicating these resources are supplementing underutilization of the Type 2 fleet.

**Table 12 – CY 2017-2021 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)
<b>2017</b>	14,572	\$27.0	\$22.2	\$49.2
<b>2018</b>	13,780	\$26.7	\$21.9	\$48.5
<b>2019</b>	9,501	\$21.1	\$14.4	\$35.5
<b>2020</b>	11,969	\$33.3	\$16.6	\$49.9
<b>2021</b>	14,096	\$38.3	\$24.1	\$62.5
<b>5-yr avg.</b>	<b>12,783.6</b>	<b>\$29.3</b>	<b>\$19.8</b>	<b>\$49.1</b>

## Rappel Program

In 2021, the USFS Rappel Program had 14 aircraft across 11 bases in 4 Regions, staffed by 267 rappellers. Rappellers supported 146 IA fires by rappel and 299 IA fires in a helitack. Additionally, 139 large fires were supported by rappel crews. Aircraft on rappel missions flew 3,016.8 flight hours in 2021 (Table 13).

**Table 13 – CY 2021 Rappel Program Use Summary**

Base	Region	Aircraft	Rappellers	Fires (Rappel)	Fires (Helitack)	Large Fires Supported	Flight Time
Gallatin	R1	33HX	17	12	25	7	190.3
Libby	R1	37HX	15	7	13	10	172.9
Lucky Peak	R4	262HQ	15	9	30	6	234.9
Salmon 1	R4	933CH	21	9	22	9	195.1
Salmon 2	R4	205LM	20	9	21	10	281.3
Price Valley 1	R4	669H	14	13	19	11	301
Price Valley 2	R4	679H	15	15	26	1	169
Trimmer	R5	223HT	18	7	25	10	172.4
La Grande 1	R6	404HA	20	8	25	5	130.1
La Grande 2	R6	205RH	22	8	19	32	345.1
Wenatchee	R6	689H	27	19	24	20	254.9
John Day	R6	28HX	21	20	22	7	181
Siskiyou	R6	205DY	26	9	22	9	206.1
Central OR	R6	205DY	22	8	7	6	181
			<b>267</b>	<b>146</b>	<b>299</b>	<b>139</b>	<b>3,016.8</b>
				<b>445 IA Fires Staffed</b>			

## Short-haul Program

In 2021 the Short-haul Program consisted of 76 crew members assigned to six different aircraft, located at seven bases in five different regions. The program logged 1465 flight hours for the year. Short-haul crews performed 836 proficiency short-hauls, 133 operational short-hauls (in cooperation with the National Park Service) and responded to 103 IA fires and 41 large fires (Table 14).

**Table 14 – CY 2021 Short-haul Program Summary<sup>3</sup>**

Base	Region	Aircraft	Crew Size	Proficiency Evolutions	Operational Evolutions	Operational Missions	Patients Rescued	Initial Attack Fires	Large Fire Support	Total Flight Hours
Tucson Helitack	R3	N401HQ <sup>4</sup>	9	48	0	0	0	12	10	117.6
Helena Av. Center	R1	N401HQ <sup>4</sup>	10	134	0	0	0	20	12	246.9
Teton Helitack #1	R4	N35HX	10	119	13 (All NPS)	10 <sup>5</sup> (All NPS)	0	30	0	227.0
Teton Helitack #2	R4	N38HX	10	125	0	0	0	5	6	189.7
McCall/Krassel	R4	N353SH	14	299	12	2	6	29	5	211.0
Wenatchee Airbase	R6	N353JR	10	111	6	2	2	7	8	286.3
California LE&I Program	R5	N407WF	13	Unknown	238	119	N/A	N/A	N/A	186.6
<b>TOTALS</b>			<b>76</b>	<b>836</b>	<b>269 (13 NPS)</b>	<b>133 (10 NPS)</b>	<b>8</b>	<b>103</b>	<b>41</b>	<b>1465.1</b>

<sup>3</sup> Previous short-haul annual data are not summarized in this FAM annual report.

<sup>4</sup> Tucson and Helena share a contract.

<sup>5</sup> Tetons also support Grand Teton National Park.

## Airtankers

In 2021, the Forest Service had 18 airtankers available under Exclusive Use and five available under Call-When-Needed (CWN) contracts. The three Exclusive Use contracts consisted of 16 LATs and two VLATs. There were five airtankers brought on under a 90-day Surge utilizing the Call-When-needed contract, three LATs and two VLATs. There were occasions when we activated additional CWN airtankers, however they were day-to-day with no guarantee. Eight MAFFS units were utilized for surge capacity needs. One airtanker from New South Wales was brought over on a foreign government agreement to add to the surge capacity.

**Table 15 – CY 2021 Airtanker Fleet Summary**

Aircraft Category	EXU Aircraft	CWN Aircraft
Large and Very Large Airtankers	18	5
MAFFS	0	8

Contract airtankers logged 7,677 flight hours in 2021, a little less than one thousand flight hours than 2020 (8,574) and 10.5% of the Agency’s total calendar year use flight time billed in IBS. Contract airtankers also delivered approximately 31.3 million gallons of retardant, with 61.5% of total delivered by LATs and 38.5% by VLATs (Table 16).

**Table 16 – CY 2021 Airtanker Use Summary by Aircraft and Contract Type**

Airtanker Type	Flight Hours	Retardant (gallons)
<b>Exclusive Use</b>		
VLAT	891.8	6,772,587
LAT	5,355.2	16,823,549
<b>EXU Subtotal</b>	<b>6,247</b>	<b>23,596,136</b>
<b>Call When Needed</b>		
VLAT	673.44	5,308,491
LAT	757.29	2,436,884
<b>CWN Subtotal</b>	<b>1,430.73</b>	<b>7,745,375</b>
<b>Total Airtanker Use</b>	<b>7,677.73</b>	<b>31,341,511</b>

In 2021, 50.0% of use by flight time was in support of Forest Service fires (derived from IBS job codes). The remaining 50.0% of use on non-agency fires went to state and local cooperators (32.0%) and the Department of Interior (18.0%; Table 17).

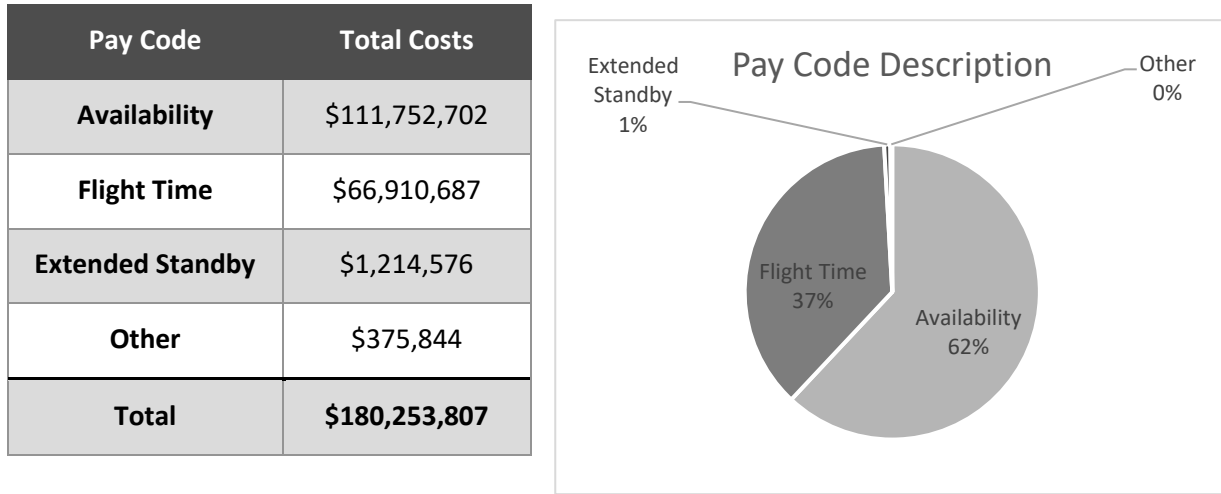
**Table 17 – CY 2021 Airtanker Flight Time by Region/Agency<sup>6</sup> (LAT/VLAT)**

Region/Agency	Flight Hours	Percent of Flight Hours
<b>FS: Region 1</b>	679.74	9.0%
<b>FS: Region 2</b>	113.20	1.0%
<b>FS: Region 3</b>	782.94	10.0%
<b>FS: Region 4</b>	306.29	4.0%
<b>FS: Region 5</b>	1,068.86	14.0%
<b>FS: Region 6</b>	582.99	8.0%
<b>FS: Region 8</b>	0	0.0%
<b>FS: Region 9</b>	54.06	1.0%
<b>FS: Region 10</b>	0	0.0%
<b>FS: Region 13 (WO)</b>	240.59	3.0%
<b>FS Total</b>	<b>3,828.67</b>	<b>50.0%</b>
<b>BIA</b>	525.48	7.0%
<b>BLM</b>	741.85	10.0%
<b>FWS</b>	3.24	0.01%
<b>NPS</b>	49.73	1.0%
<b>DOI Total</b>	<b>1,320.30</b>	<b>18.0%</b>
<b>Non-Fed Fire (State)</b>	<b>2,526.47</b>	<b>32.0%</b>
<b>Other</b>	<b>1.67</b>	<b>0.0%</b>
<b>Grand Total</b>	<b>7,677.73</b>	<b>100.0%</b>

Contract LAT/VLAT expenditures were \$180.2 million in CY 2021. Availability charges totaled \$111.8 million (62.0%), and flight time costs were \$66.9 million (37.1%). Standby and other expenses accounted for the remaining costs (\$1.5 million, 0.9%; Figure 9). All LAT/VLAT expenditures (not including scoopers) represented 24.0% of total agency aircraft expenditures billed in IBS.

<sup>6</sup> Region/Agency derived from Incident Finance Job Codes from IBS data.

**Figure 9 – CY 2021 Contract LAT/VLAT Costs by Pay Code Description**



For EXU airtankers, RJ85 aircraft flew the most in 2021 (2,163.68 hours), followed by BAE 146 aircraft (1,911.77 hours), DC-10 aircraft (1,565.24 hours), and MD-87 aircraft (1,155.58 hours). RJ85 aircraft also had the highest availability cost (\$26.98 million). DC-10 aircraft delivered the most retardant (12.1 million gallons; Table 18).

**Table 18 – CY 2021 EXU Contract LAT/VLAT Use Summary by Aircraft Model**

Aircraft Model	Flight Hours	Retardant (gallons)	Availability Costs
<b>BAe-146</b>	1,911.77	5,901,139	\$26,983,650
<b>RJ85</b>	2,163.68	6,216,761	\$30,266,522
<b>DC-10</b>	1,565.24	12,081,078	\$20,948,920
<b>MD-87</b>	1,155.58	3,508,914	\$20,560,850
<b>EC-130Q</b>	542.31	2,140,093	\$7,580,760
<b>B-737</b>	337.91	1,493,526	\$5,412,000
<b>Total</b>	<b>7,676.49</b>	<b>31,341,511</b>	<b>\$111,752,702</b>

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. Compared to the five prior years, 2021 EXU LAT total flight time (5,355 hours) and retardant gallons delivered (16.8 million gallons) were above average (Table 19). EXU VLATs had similar patterns, although both total flight time (892 hours) and retardant gallons (6.8 million gallons) were above the 5-year average values (Table 20).



**Table 19 – CY 2017-2021 EXU LAT Use Summary**

Calendar Year	Flight Hours	Retardant (gallons)
2017	6,156	25,711,954
2018	4,021	12,976,364
2019	2,273	7,081,902
2020	4,229	12,632,713
2021	5,355	16,823,549
5-yr average	4,406	15,045,296

**Table 20 – CY 2017-2021 EXU VLAT Use Summary**

Calendar Year	Flight Hours	Retardant (gallons)
2017	673	6,670,145
2018	678	5,178,692
2019	491	3,768,052
2020	943	5,538,281
2021	892	6,772,587
5-yr average	735	5,585,551

CWN airtankers were used not as extensively in 2021. LAT flight time (757 hours) were below the 5-year average (Table 21). Retardant totals also were below the 5-year average (2.4 million gallons; Table 22). CWN VLATs demonstrated different patterns with heavy utilization (673 hours) and gallons delivered (5.3 million gallons; Table 21).

**Table 21 – CY 2017-2021 CWN LAT Use Summary**

Calendar Year	Flight Hours	Retardant (gallons)
2017	395	1,658,126
2018	1,196	4,194,568
2019	608	2,047,461
2020	3,707	11,706,065
2021	757	2,445,884
5-yr average	1,333	4,410,421

**Table 22 – CY 2017-2021 CWN VLAT Use Summary**

Calendar Year	Flight Hours	Retardant (gallons)
<b>2017</b>	199	1,991,424
<b>2018</b>	291	1,970,183
<b>2019</b>	55	316,319
<b>2020</b>	570	4,042,116
<b>2021</b>	673	5,308,491
<b>5-yr average</b>	<b>358</b>	<b>2,725,707</b>

**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 IBS for payment. Following 2020, MAFFS saw an even heavier surge capacity use in 2021 to meet increased demand for airtankers. There were 944.8 hours of annual flight time for fire support to deliver 2.6 million gallons of retardant, at a cost of \$15.4 million (Table 23). Including certification flights, total program costs in 2021 were \$18.3 million (Table 25).

**Table 23 – CY 2017-2021 MAFFS Summary of Activation on Fires<sup>7</sup>**

Calendar Year	Flight Hours	Retardant (gallons)	Total Costs
<b>2017<sup>8</sup></b>	354.7	1,051,084	\$6,437,386
<b>2018</b>	332.9	798,319	\$5,125,915
<b>2019</b>	0	0	0
<b>2020</b>	599.2	1,369,108	\$8,341,585
<b>2021</b>	944.8	2,588,594	\$15,422,340
<b>5-Year Average</b>	<b>446.3</b>	<b>1,161,421</b>	<b>\$7,065,445</b>

**Table 24 – CY 2017-2021 MAFFS Total Use Summary (Including Certification and Activation on Fires)<sup>15</sup>**

Calendar Year	Flight Hours	Total Costs
<b>2017</b>	489.4	\$9,134,378
<b>2018</b>	502.4	\$7,788,186
<b>2019</b>	118.1	\$1,942,898
<b>2020</b>	698.7	\$10,047,121
<b>2021</b>	1,117.2	\$18,335,102
<b>5-Year Average</b>	<b>585.2</b>	<b>\$9,449,537</b>

<sup>7</sup> Historic Data has been updated from the prior year’s USFS Annual Aviation Report due to the availability of more comprehensive data

<sup>8</sup> CY 2017 Data is inclusive of 85.2 Flight Hours, 228,062 gallons of retardant, and \$1,154,999 in costs resulting of a California State activation of the MAFFs Program

**Table 25 – CY 2017-2021 MAFFS Costs by Charge Category<sup>9</sup>**

Calendar Year	Certification Costs	Fire Activation Costs	Total Costs
<b>2017</b>	\$2,696,992	\$6,437,386	\$9,134,378
<b>2018</b>	\$2,662,271	\$5,125,915	\$7,788,186
<b>2019</b>	\$1,942,898	0	\$1,942,898
<b>2020</b>	\$1,705,536	\$8,341,585	\$10,047,121
<b>2021</b>	\$2,912,762	\$15,422,340	\$18,335,102
<b>5-Year Average</b>	<b>\$2,384,092</b>	<b>\$7,065,445</b>	<b>\$9,449,537</b>

## Water Scoopers

The Forest Service contracted a total of eight multi-engine water scoopers between May 10, 2021 and Oct 21, 2021 on the new CWN/MATOC contract. These aircraft collectively flew 1,598.35 hours, just under 250 hours over the total scoper hours from 2020. Total costs in ABS were \$55.3 million, and the aircraft delivered just under 9.8 million gallons of water. Just under 51% of total costs, or \$28.2 million, were attributed to aircraft availability charges, compared to 57% from 2020.

**Table 26 – CY 2021 Water Scooper Fleet Summary**

Aircraft Category	EXU Aircraft	CWN Aircraft
<b>Water Scoopers</b>	0	8

**Table 27 – CY 2017-2021 Scooper Use Summary**

Calendar Year	Flight Hours	Water Delivered (gallons)	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
<b>2017</b>	1,676	7,841,107	\$30.5	\$23.3	\$53.8
<b>2018</b>	1,609	8,795,257	\$27.8	\$23.0	\$50.8
<b>2019</b>	679	3,292,206	\$12.5	\$9.9	\$22.5
<b>2020</b>	1,432	6,253,548	\$28.8	\$21.7	\$50.5
<b>2021</b>	1,598	9,783,949	\$28.2	\$27.0	\$55.3
<b>5-yr avg.</b>	<b>1,399</b>	<b>7,031,240</b>	<b>\$24.0</b>	<b>\$20.0</b>	<b>\$45.0</b>

<sup>9</sup> Historic Data has been updated from the prior year’s USFS Annual Aviation Report due to the availability of more comprehensive data

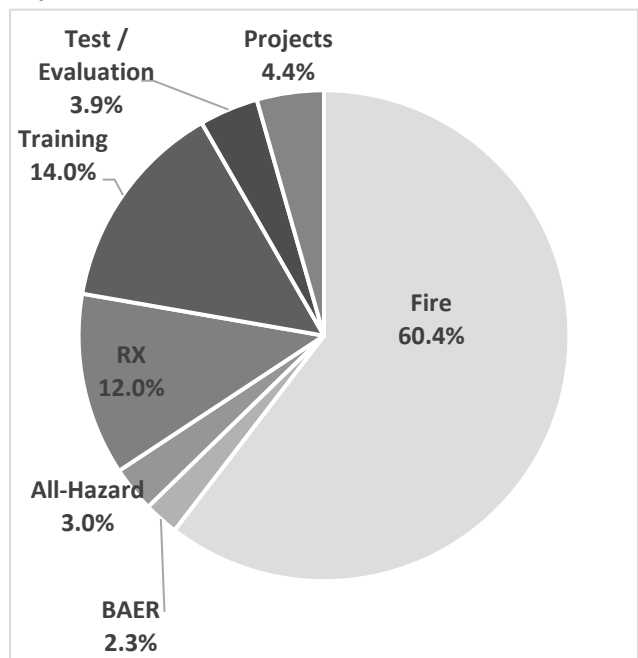
## Unmanned Aircraft Systems (UAS) Program

In 2021, the UAS program tested and evaluated multiple domestic UAS manufactures targeting a Type III system that could meet 80% of the initial agency needs. Research and Development (R&D) also worked to find a domestic replacement for the aerial ignition platform. Targeted vendors were found that passed testing and evaluation processes and BPAs were crafted to leverage the service. R&D led with a new aerial ignition platform which expanded into operations.

UAS utilization expanded outside of fire operations for the first time in 2021. COVID-19 was a challenge to overall expansion but was mitigated to achieve immediate mission objectives. Overall, there were 2,662 flights totaling 566 flight hours (Figure 10).

**Figure 10 – CY 2021 UAS Use Summary by Mission Description**

Mission Type	Flight Hours
Fire	342
BAER	13
All-Hazard	17
RX	968
Training	79
Test / Evaluation	22
Projects	25
<b>Total</b>	<b>566.0</b>



## Agency-Owned Aircraft Summary

The Forest Service owned and operated 25 aircraft in 2021. Agency aircraft accounted for 4,161.2 (5.7%) of the 72,821 total flight hours billed in IBS in 2020 (Table 27).

**Table 28 – CY 2021 Agency Aircraft Use Summary by Aircraft Make and Model**

Registration #	Make	Model	Flight Hours
N106Z	BELL	206A	22.1
N107Z	BELL	209 COBRA	143.8
N109Z	BELL	209 COBRA	403.2
N106FS	DEHAVILLAND	DHC-2 BEAVER	62.0
N191Z	DEHAVILLAND	DHC-2 BEAVER	229.9
N192Z	DEHAVILLAND	DHC-2 BEAVER	258.3
N193Z	DEHAVILLAND	DHC-2 BEAVER	289.4
N114Z	SHORT BROS	SD3-60 SHERPA	42.1
N145Z	SHORT BROS	SD3-60 SHERPA	151.6
N148Z	SHORT BROS	SD3-60 SHERPA	218.0
N161Z	SHORT BROS	SD3-60 SHERPA	161.0
N162Z	SHORT BROS	SD3-60 SHERPA	189.2
N163Z	SHORT BROS	SD3-60 SHERPA	133.3
N174Z	SHORT BROS	SD3-60 SHERPA	12.8
N176Z	SHORT BROS	SD3-60 SHERPA	142.1
N110Z	SHORT BROS	SD3-60 SHERPA	1.3
N141Z	DEHAVILLAND	DHC-6-300	168.9
N143Z	DEHAVILLAND	DHC-6-300	185.4
N166Z	CESSNA	CE-206-G	52.1
N111Z	CESSNA	206 STATIONAIR-6	2.6
N125Z	QUEST	KODIAK 100	213.5
N160Z	QUEST	KODIAK 100	307.8
N147Z	BEECH	B200GT	325.2
N149Z	BEECH	KING AIR 200	443.9
N182Z	BEECH	KING AIR 200	1.7
<b>Total</b>			<b>4,161.2</b>

## 5-year Aviation Summary Trends and Averages

2021 total flight time for fixed-wing virtually matched the 5-year average while all other aircraft types were above (Table 28). These numbers reflect the high fire season demands in 2021.

**Table 29 – CY 2017-2021 Flight Hours by Aircraft Type**

Calendar Year	Fixed-Wing	Helicopter	Airtanker	Scooper	Total
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
2020	29,195	43,248	9,449	1,432	83,324
2021	26,249	45,791	7,678	1,598	81,487
<b>5-Yr Avg.</b>	<b>26,284</b>	<b>38,413</b>	<b>6,725</b>	<b>1,399</b>	<b>72,821</b>

In 2021, passenger totals from all aircraft remained near the 5-year average, and total cargo in pounds was well above the 5-year average. While cargo is on a short-term up-trend, there are no discernable trends in passenger transport over the past five years (Table 29).

**Table 30 – CY 2017-2021 Passenger and Cargo Summary (All Aircraft)**

Calendar Year	Flight Hours	# of Passengers	Cargo Weight (lbs.)
2017	83,184	86,175	12,707,407
2018	76,230	79,926	16,308,212
2019	42,570	72,295	12,814,010
2020	83,324	77,444	20,645,311
2021	81,487	74,819	25,508,170
<b>5-Yr Avg.</b>	<b>73,359</b>	<b>78,132</b>	<b>17,596,622</b>

Total retardant delivery at 33.9 million gallons was above the 5-year average of 29.2 million gallons. There is no discernible trend in retardant delivery totals from the last five years (Table 30).

**Table 31 – CY 2017-2021 Total Retardant Delivered (All Aircraft)**

Calendar Year	Retardant (gallons)
2017	33,515,515
2018	27,282,194
2019	13,515,907
2020	37,521,892
2021	33,930,105
<b>5-Yr Average</b>	<b>29,153,123</b>

The total aviation contract costs in 2021 (\$751.4 million) were consistent with 2020 (\$746.4 million). Both years represented exceptional challenges, and subsequently, demand was extremely high and related expenditures were well above average (Table 31).

**Table 32 – CY 2017-2021 Total Contract Aviation Costs<sup>10</sup>**

Calendar Year	Availability Costs (Millions USD)	Flight and Other Costs (Millions USD)	Total Costs (Millions USD)
<b>2017</b>	\$349.2	\$270.7	\$619.9
<b>2018</b>	\$344.9	\$262.1	\$607.0
<b>2019</b>	\$264.3	\$133.3	\$397.5
<b>2020</b>	\$435.7	\$310.8	\$746.4
<b>2021</b>	\$428.4	\$323.1	\$751.4
<b>5-Yr Avg.</b>	<b>\$364.5</b>	<b>\$260.0</b>	<b>\$624.5</b>

<sup>10</sup> Total contract cost is derived from IBS. Total availability cost includes non-availability.