

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



WPR24FA238

OPERATIONAL FACTORS

February 1, 2026

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ACCIDENT

Location: Helena, MT
Date: July 10, 2024
Time: 12:10 Local
18:10 Zulu
Aircraft: N10122 Air Tractor AT-802A

OPERATIONAL FACTORS

Group Chair	Albert Nixon NTSB Phoenix, AZ
Member	Michael Savage Lead 4-5 National Office Airplane Pilot USFS Instructor/Evaluator/Inspector Boise, ID
Member	Lea Weinkauff USFS Air Safety Investigator Boise, ID
Member	Jesse Weaver Dauntless Air Chief Pilot/Director of Operations Lafayette, LA

SUMMARY

1.0 HISTORY OF FLIGHT

On July 10, 2024, about 1210 mountain daylight time, an Air Tractor AT-802A, N10122, was substantially damaged when it was involved in an accident near Helena, Montana. The pilot was fatally injured. The airplane was operated as public use aircraft for the purpose of firefighting.

Four of their single engine air tankers (SEAT) were deployed to Helena, Montana, for the United States Forest Service (USFS) in support of aerial firefighting efforts for the Horse Gulch Fire. The flight of four departed Coeur d'Alene Airport - Pappy Boyington Field (COE), Coeur d'Alene, Idaho, about 1 hour 44 minutes before the accident, and flew directly to Hauser Lake and entered the Fire Traffic Area while

under the operational control of the USFS. The accident airplane was in the No. 2 position. The flight accomplished a reconnaissance of the lake where they were scooping water from, and flight lead instructed each pilot that they would scoop single file and to remain in the center of the waterway and give adequate space for the airplane in front of you. All pilots in the flight acknowledged.

The lead airplane began its scoop northbound. During its first scoop sequence, as lead's probes deployed, he noticed a slight tailwind component of the water at which point he aborted the scoop. He then called for the remaining airplanes to abort their scoop, the No. 3 and No. 4 airplanes acknowledged but No. 2 airplane did not. He called for the abort again, specifically for No. 2 airplane but there was no reply.

Witnesses on the lake and the pilots of the 2 SEATs flying behind the accident airplane saw the airplane track slightly to the left and to the southwest. Subsequently the airplane impacted a vertical rockface bordering the southern shoreline of the lake, fell into the lake, and sank.

The accident airplane was equipped with a SpiderTrack flight tracking system. The downloaded data showed that after departing COE, the airplane turned to a southeasterly heading and ascended to an altitude of about 9,400 ft mean sea level (msl). The airplane continued on a southeasterly heading, at altitudes between 9,275 ft and 9,575 ft msl, until it began a descent at 1146.

The flight of four airplanes overflew Hauser Lake, completed several turns, before they made a descending right turn from the east side of the lake. The accident airplane descended to the lake's surface, on a track of about 279° magnetic, and traveled about 4,233 ft over the water. The airplane then turned left turn to a heading of 269° and traveled about 1,447 ft. until the data ended in an area of the accident site.

2.0 Pilot Information¹

The pilot was 45 years old and held a Commercial pilot certificate with a rating for single engine land and sea and instrument airplane. She held a second class medical certificate dated February 20, 2024, with no limitations.

2.1 Pilot Certification Records¹

FAA records of the pilot indicated the following:

¹ The pilot's records are contained in Attachment 1.

Commercial Pilot-Airplane Single Engine Land and Sea, Certificate.

Commercial Pilot-Instrument Airplane; English proficient.

Second Class Medical Certificate issued on February 20, 2024.

2.2 Flight Hours¹

The pilot's hire date with Dauntless Air was January 2024. According to the pilot's information on file at Dauntless Air, the pilot reported to have 6,500 total flight time in and was previously employed by AgWerx for 3 years. The pilot reported to have experience of 68 flight hours in type, 1,500 flight hours in turboprop, 3,000 flight hours low level in airplane below 500 ft. and 1,445 flight hours in airtanker/dispensing operations.

The following pilot flight hours were provided by Dauntless Air. 122 scoops in training. Ferry time 42.8 flight hours. Flight time after April 6, 2024, included 25 hours of flight time, 18 scoops, and 2 fire missions for 3.5 flight hours, and 10 scoops as well as 2 ground loads. Note: Total hours that were reported on the pilot's Interagency Airplane Pilot Evaluation Application on April 6, 2024, added to the hours provided by Dauntless Air since the application.

Previous 24 hours	0
Previous 7 days	0
Previous 90 days	about 28.5
Total flight hours obtained in Training	25.2 (13.6 Initial)
Total hours Fire Boss	96.5
Total Hours	6,528.5

The pilot had no disciplinary actions from the company.

2.3 Pilot 72-Hour History

In the 72 hours prior to the accident the pilot had been on call shift for those three days. On July 7, 8, and 9, 2024, the accident pilot was on fire standby at COE from 0900-1800.

The pilot had not flown in July besides on the accident flight. The last flight before the accident flight, was flown on June 27, 2024, for a duration of 1.4 hours.

Pilots that flew in the formation with her on the accident day commented: one said that the accident pilot seemed to be in good spirits, looked fine, and was how he would normally see her every day. Another pilot said she was in a very good mood and quite excited for the challenge of the day and that she never mentioned any issues or anything that she was having that day. The third pilot said as far as he could tell, she looked rested and in good spirits.

2.4 Training²

The following information about the pilot's training was provided by Dauntless Air:

Pilot Date of Hire	January 10, 2024
Initial Ground Training	February 8, 2024
Initial New-Hire Flight Training	February 14, 2024
Fire Boss/Air Tractor 802 Simulator	April 18 &19, 2024
Emergency Training - During Simulator	April 19, 2024
USDA Interagency Pilot Qualification Card	April 12, 2024

2.5 Dauntless Air Single Engine Scooper Initial Training

A new hire pilot at Dauntless Air was required to be certified in the Air Tractor AT-802. Dauntless Air new hire pilots would receive instruction on the Fire Boss amphibious airplane and how to scoop water.

The initial segment 1 of ground training lessons covered the following airplane systems: engine and components, fuel systems, flight controls, hydraulic systems. electrical system, floats/gear/water rudders, and fire gate. Segment 2 of initial ground training covered normal operations including ground and flight operations. Segment 3 covered emergency operations including critical action emergencies and non-critical action malfunctions. The next initial training segment 4 was on seaplane operations. Normal water landings, taxis, and step taxis, were covered. Additionally, directional tracking, 3-point touch down picture, river confined area scooping and glassy water and crosswinds were covered. Segment 5 of ground training was the longest segment that covered fire operations. Operational flow and structure, airspace structure, communications, the structure of the fire, drop tactics, and type of retardants were trained. The final lesson covered mountain flying, low level considerations, high density altitude operations and considerations, human factors, and unusual attitude/upset recovery.

² Source Dauntless Air training records are contained in Attachment 1.

The ground training consisted of about 7 hours of academics before the student started flying. Once the introductory flight was accomplished, then flight and ground training continue simultaneously. The initial ground training required 20 hours to accomplish.

The initial fire boss flight training was designed around a syllabus of 11 training flights designed to familiarize the student with the basic operations and flight characteristics of the Fire Boss. Usually with at least one flight a day within a two week period with an instructor, was accomplished, in order to get signed solo and as Pilot in Command of the Fire Boss amphibious airplane. Each flight had a description that contained the desired maneuvers for the flight.

Give the different types of background of new hire pilots, additional flights after the 11th flight in the initial Fire Boss Training program would be provided on a case by case basis and will usually be solo if they are needed for the student pilot to gain comfort and or if the instructor pilot wants to be confident that the student pilot meets the desired proficiency. Their syllabus allowed customizing the training to meet the individual needs and can easily repeat training flights.

Advanced Tactical flight training followed which was orientated towards formation flying and tactical employment of the airplane in a fire. The advanced tactical training consisted of ground training and about 7.5 hours of flight time where the new hire pilots fly 3 formation training flights with instructors and then work into tactical training. The ground training consisted of formation operations, Fire Traffic Area (FTA) operations, and an introduction to aircraft separation plans. Flight training included 2-ship and 4-ship flight operations, full scenario fire mission as a 4 ship, and full scenario fire mission as 2-ship and join up with another 2-ship. According to the training manual "all missions will include scooping, dropping, communication procedures, FTA operation procedures, and practiced loss site/blind procedures."

Recurrent training or annual company training is broken into ground and flight training. The flying portion is conducted during the first week and the ground portion during the second week and consisted of about 1-3 hours of flight time, depending on the experience level of the pilot. The company flight training is where the students are introduced to flying in flights up to four airplanes, and in the procedures for fire fighting in a tactical fire area.

The last portion of the training consists of Company (Contract) Training. This portion of training is accomplished in accordance with customer's contract requirements and given in scenario based training environment discussions and tabletop exercises. The minimum required ground training is 18 hours.

Once the student pilot has completed all required curriculum training, written examinations, and satisfactory completion of required flight training, the pilot will

become fully qualified to serve as a SEAT pilot in the Fire Boss upon satisfactory completion of the appropriate qualification segment. The qualification and checking included oral and written testing and an aircraft check.

The accident pilot had passed all required training with Dauntless Air and had no failures in her training record³. She completed her ground training in two days. During flight training, she flew 12 flights in 10 days. On February 14, 2024, she was signed off as completed Air Tractor 802/802A (Scooper) Initial Ground and Flight Training to a satisfactory level and cleared to solo/PIC operation of the airplane.

The USDA interagency USDI Airplane Pilot Qualification Card was issued on April 12, 2024, and the accident pilot was qualified as a Single Engine Air Tanker (SEAT) level II. An annual flight evaluation was required each 12 months for a Level II pilot.

Dauntless Air SEAT Training Program manual outlined the initial Fire Boss training, company training, and contract flight training.

3.0 Aircraft Information

The airplane was an Air Tractor 802F with a Wipaire 10000 Series Amphibious Water Scooping Float System (i.e., Fire Boss). The serial number was 802A-0495 and was manufactured in 2013 with a restricted category. The aircraft was modified with amphibious floats on April 12, 2013. The aircraft was certified with a Pratt & Whitney PT6A-67F turboprop engine.

The airplane Single Engine Air Tanker (SEAT) aircraft data card issued by the Department of the Interior Office of Aviation Services was inspected and approved on April 19, 2024, and expired on April 20, 2025. Aircraft documentation, equipment, miscellaneous equipment, aircraft instruments, and avionics were all noted as passed on the form.

During the aircraft examination it was determined that the flaps were fully extended, which was consistent with their Standard Operating Procedure, where Dauntless Air senior management approves the use of alternate flap settings if no aircraft limitations are exceeded.³ Additionally, "Dauntless Air approves of and demonstrates to new pilots during training, the technique of using full flaps to help get an aircraft off the water. The technique of applying full flaps once the aircraft has reached 65 knots on the water reduces the amount of time and distance it takes to get in the air significantly."

³ Source Dauntless Air, records are contained in Attachment 3.



Figure 1: Accident Airplane (Source: Flightradar 24)

3.1 Flight Track System

Dauntless Air attached a lightweight, portable, 'real-time' GPS tracking device called Spidertrack to their airplanes to provide flight track information. Spidertrack would transmit critical data (such as location, speed, altitude, direction) every minute. Formerly Spidertrack was acquired by the Vellox group. Each airplane has its own flight track data. The flight data points were about on a 15 second interval. Note: the synchronization of flight track data between each airplane in the flight varied slightly on the time the data points recorded in each airplane (from 2 seconds minimum to a maximum of 8 seconds between airplanes).

The last portion of the accident flight track:



Figure 2: Accident Airplane Flight Track (Data Courtesy of Dauntless Air)

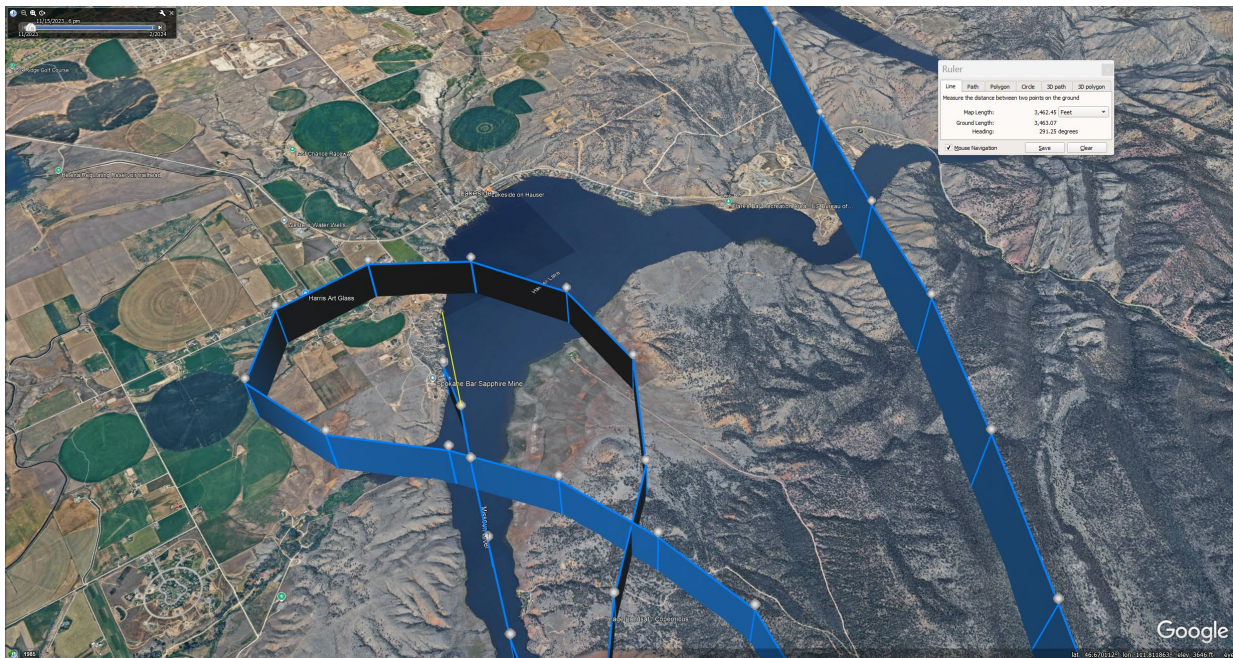


Figure 3: Original Airplane Heading Extended. (Data Courtesy of Dauntless Air).

If the original heading on the scoop run was extended, about 3,462 ft of additional water was available.

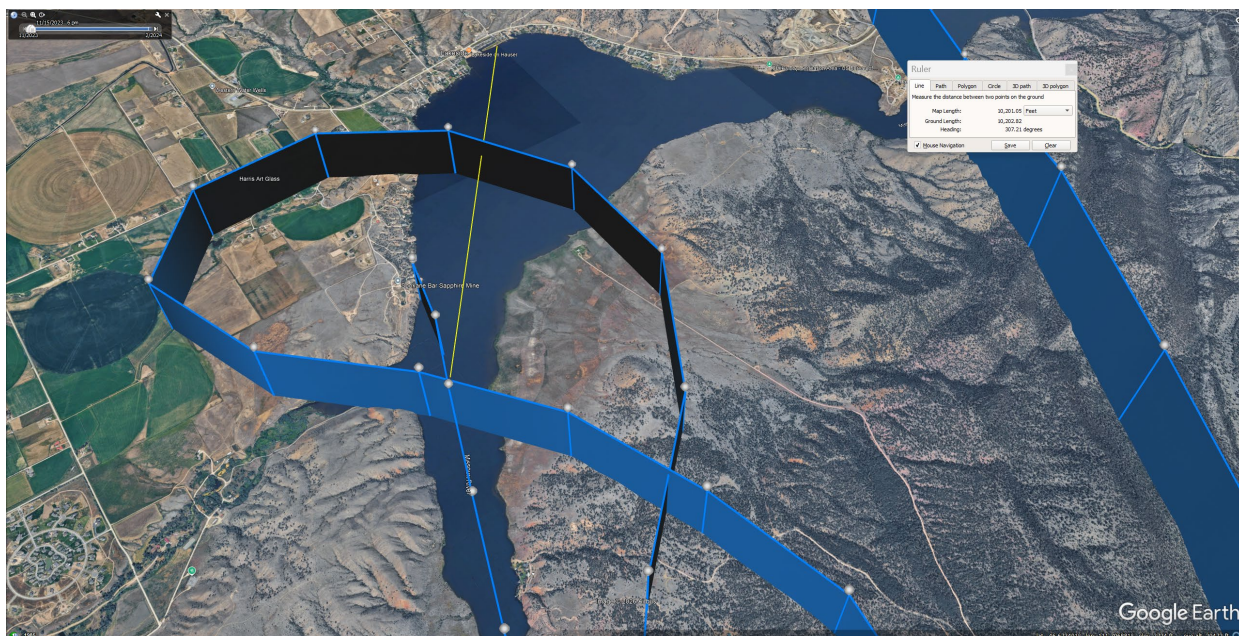


Figure 4: Airplane track on lake if middle portion of lake mouth flown. (Data Courtesy of Dauntless Air).

If the original heading on the scoop run was corrected to the right to fly the middle portion of the mouth that led into the larger portion of the lake, about 10,201 ft of additional water was available.

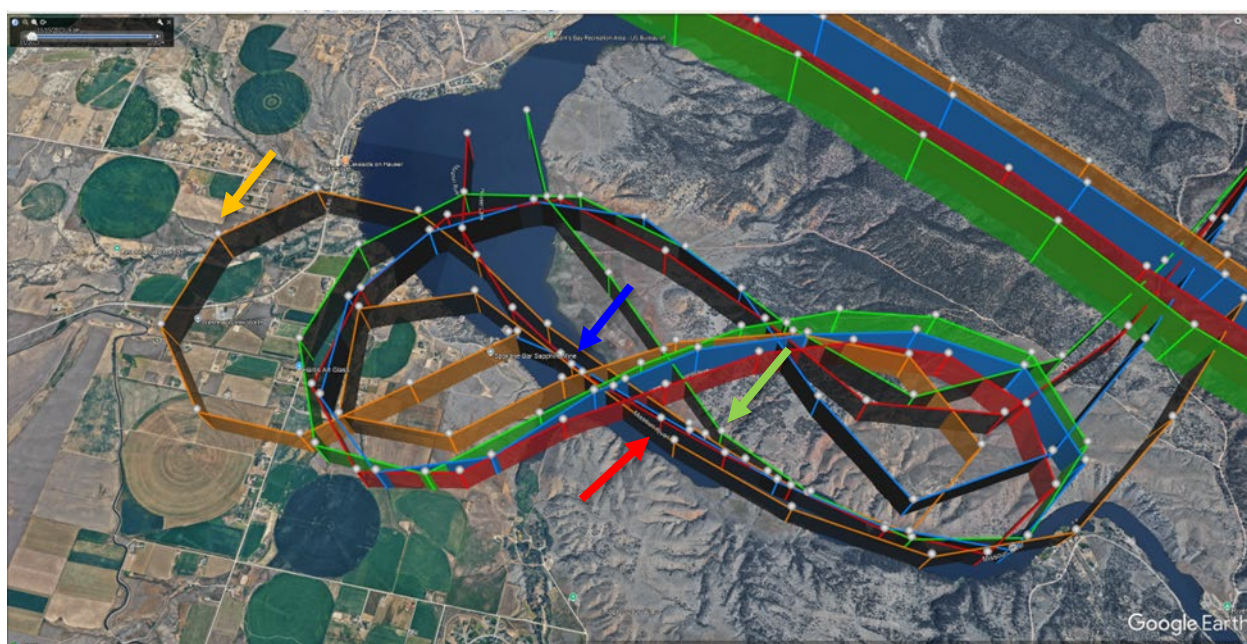


Figure 5: Airplane's flight path overlaid with Lead's (Orange), Accident Airplane - Number 2 (Blue), Number 3 (Red), and Number 4 (Green), at about 1209. (Data Courtesy of Dauntless Air).

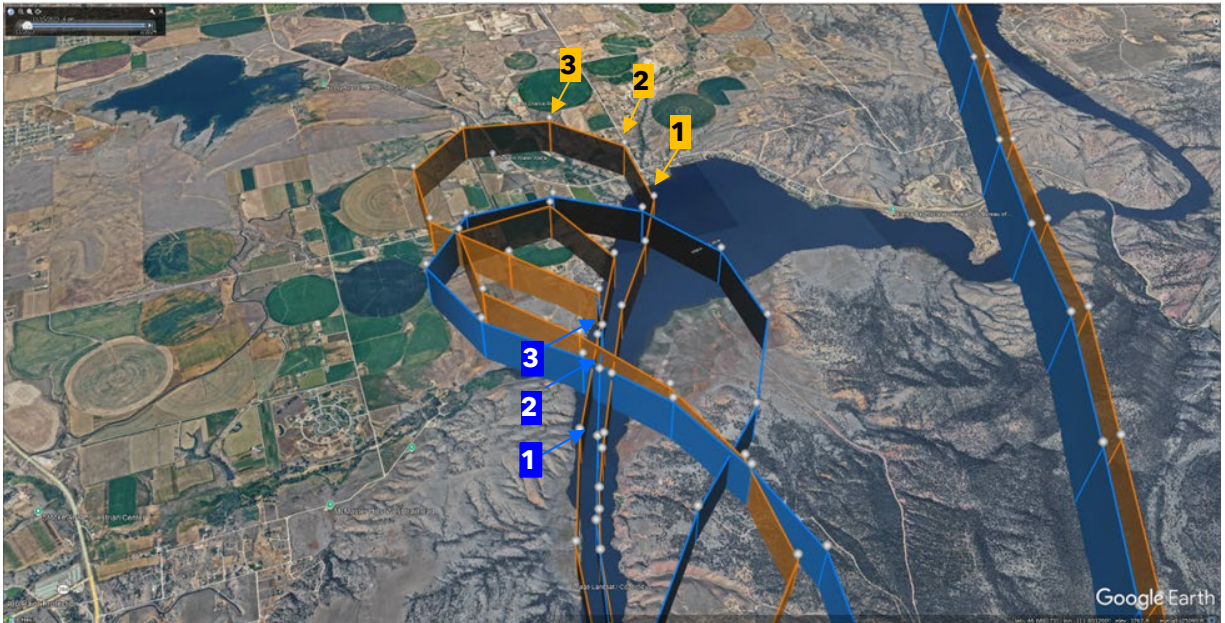


Figure 6: Airplane flight paths overlayed with Lead's (Orange) and Accident Airplane - Number 2 (Blue), Data Points labeled Number 1, 2, and 3, are for about the same timeframe between the two airplanes. (Courtesy of Dauntless Air).

In reviewing the flight path between the lead and number 2 (accident airplane), number 2 was initially following the lead's path but then at data point 1, when the lead begins a left turn, number 2 starts to slowly diverge to the left, away from lead's path when it passed the same area. At data point 2, lead continues its left turn, and the number 2 continues to diverge left from lead's path. At point 3, lead is still in the left turn while number 2 increases its divergence to the left.

4.0 Accident Site - Hauser Lake

According to the visit Montana Website, Hauser Lake is a 3,200 acre reservoir on the Missouri River created by Hauser Dam. It is located about 11.5 miles northeast of Helena, Montana. The area of the lake where the water was scooped measured between about 1,000 ft wide to over 1,800 ft wide at the widest point and the length would depend on the heading on the lake. The accident site was located at an elevation of about 3,653 ft mean sea level (MSL), Using the environmental factors at the accident time the density altitude was calculated to be about 6,402 ft msl.



Figure 7: Hauser Lake (Source: Google)

4.1 Recent maintenance

On March 9, 2024, an annual inspection was performed on the airplane, engine, propeller, and Garmin avionics. The airframe and components were approved for return to service.

5.0 Operator Information

Dauntless Air is a privately owned company operating on-call firefighting contracts for state and federal aerial firefighting. The company is headquartered in Appleton, Minnesota. The company owns and operates about 20 amphibious AT-802F Fire Boss airplanes.

Oversight of Dauntless Air is performed by Department of Aviation Service (OAS), U.S. Department of the Interior, and the FAA.

Dauntless Air was certified under Title 14 Code of Federal Regulations, Part 137 Commercial Agricultural Aircraft operations. Each aircraft and pilot must be currently carded to meet all interagency, (USFS, BLM, OAS, SEAT/AWS) requirements.

5.1 Dauntless Air Organizational structure

The Safety Management System Plan and Procedures Manual provided Dauntless Air's Organization Chart:

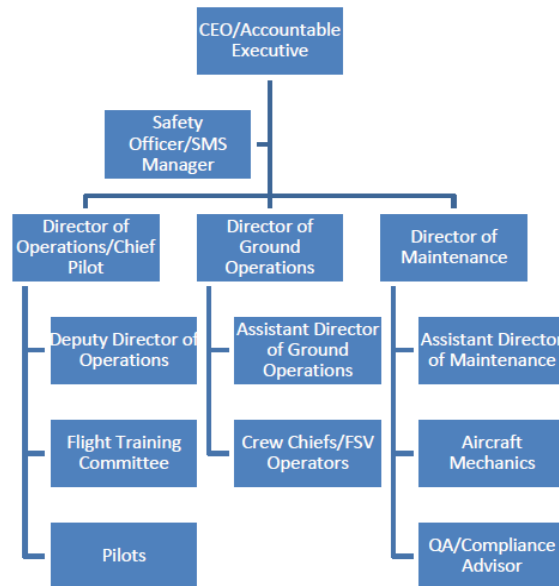


Figure 8: Dauntless Air Organization Chart. (Courtesy of Dauntless Air).

5.2 Weight and Balance

Dauntless Air uses a computer based program, on a company account on myfireplane.com, to determine weight and balance for each flight segment.

- The weight of the pilot, fuel, baggage, rinse tank, LH float compartment, RH Float foam, Gel system, and Hopper.
- The total weight of the loaded aircraft.
- The maximum allowable takeoff weight for that flight.
- The center of gravity limits.
- The empty weight and CG.

The Weight and Balance were determined to be within limits for the takeoff and for the takeoff from the water (with a hopper load of 4,704 lbs. maximum).⁴

5.3 Safety Management System

In 2022, Dauntless Air issued the original version of the Safety Management System (SMS) Plan and Procedures Manual. SMS was required by OAS for operators on fire-fighting contracts; it was not required by the FAA. According to their SMS Plan

⁴ Charts are contained in Attachment 4

and Procedures Manual, all employees and contractors directly working for Dauntless Air are included as part of the safety management oversight and managed safety practices. The Safety Officer/SMS Manager is accountable to the Accountable Executive and oversees the development and evolution of the SMS program.

5.4 Dauntless Air Flight Risk Assessment Tool

According to Appendix E of the Dauntless Air Safety Management System Plan and Procedures Manual, the company uses a Mission Flight Risk Assessment Tool (MFRAT) as their risk assessment tool to be completed by the pilot flying the mission and when required discussed with and approved by the Director of Operations Chief Pilot/Assistant Director of Operations, prior to mission execution.

1. Aircraft Condition, to include tire wear, avionics and instrument malfunction, and number of deferred maintenance items.
2. Weather, including visibility and thunderstorms.
3. Aircraft Performance, including load control, density altitude, crosswind, and climb performance.
4. Mission Environment, including visibility, terrain, turbulence, and FTA congestion.
5. Human Factors, including duty times and fatigue.

The risk assessment tool had the above flight risk categories that the pilots scored to between 1-5 one each category. A score of below a numerical total of 15 for each of the 5 risk categories was a "go." A numerical total score between 16-20 required contact with the Chief Pilot or Director of Operations. A score of 5 in any one of the flight risk categories or a total numerical score of 21 or great was a no-go, until the risks were mitigated.

The risk assessment score for the accident flight was rated low by the number 3 airplane pilot and in the middle by the number four airplane pilot, which would be go and require no contact with supervision.

The MFRAT tool has a section to assess Human Factors, including duty times and fatigue, and while there was no specific company fatigue program, any potential pilot fatigue issue should be addressed by Dauntless Air's Standard Operating Procedures for Aerial Firefighting that stated the following in part: *"Dauntless Air pilots have the right as well as full authority and the responsibility to turn down a dispatch if they determine that the mission cannot be accomplished without undue risk to himself or the aircraft."*

5.4 Relevant Company Manuals

Dauntless Air Standard Operation Procedures:

GENERAL

This manual is intended to detail the company's procedures that are not covered in any other of the Dauntless Air operating documents (e.g., Aircraft Flight Manual, Flight Manual Supplements, checklists, NWCG Standards for Single Engine Air Tanker Guidebook, contracts, and FAR Parts 91 and 137). Dauntless Air pilots are required to operate safely within the limitations and requirements of all these documents. In the event of conflicting information between these documents the Contract in force will take precedence; however, safety of flight supersedes all.

This manual provides standard operating procedures used by many pilots on the line. It is important to note that this is a company policy and procedures document that is intended to be a guideline for pilots. Pilots are encouraged to operate within these guidelines but can deviate from them as required based on varying situations encountered during fire missions. If a pilot decides to deviate from a Standard Operating Procedure, it is important that the pilot briefs his/her wingman before executing the maneuver. The purpose of this is to provide a new arriving wingman with as much information as possible on how a mission will be flown without having to have an extensive brief.

PREFLIGHT

Dauntless Air flight crews are required to report for duty at a time designated by tanker base personnel and appropriate managers. Before accepting a mission, pilots will preflight their aircraft, perform a weight & balance and performance calculation, and complete a Mission Flight Risk Assessment Toll (MFRAT). The MFRAT may be completed on the MYFIREPLANE app or as a group during the morning briefing.

Part of the morning briefing should be used to decide how aircraft will be dispatched (i.e., single ship or in Flights of two or more). If in Flights, a Flight Lead should be designated and wingmen assigned their position and responsibilities within the flight, such as Flight Following with dispatch, monitoring weather, etc. A Flight (Flt) made up of pilots from different vendors is acceptable provided it is briefed and everyone knows their responsibilities within the flight. Dauntless Air pilots will use our Group Tactics techniques covered at company training as a guide for managing flights. Once the morning briefing is completed the pilots should be ready to accept a dispatch.

DEPARTURE/CRUISE

This segment of flight should be used to gather any new information about the mission that could be critical to its success (e.g., weather changes, additional aircraft and resources responding to the same fire or other fires in the area, and any changes in the original dispatch instructions). The cruise segment of the flight should also be used for additional mission planning. Critical items for discussion might include time on station, fuel endurance, refueling locations, and potential scoop sites. Specific procedures include:

- Route position: Greater than 500' but less than ½ mile from the preceding aircraft unless specified otherwise
- Climb to appropriate altitude for terrain clearance, weather, and optimum fuel efficiency
- Wing: If unable to maintain position, inform Lead "2's stripped"
- Cruise power settings: Lead use 3500 LBS/FT Torque/1500 Np, to provide wingmen with the necessary power advantage to maintain position
- Lead has primary navigation; wing is responsible for clearing
- Lead push Flight to Air-to-Air frequency as required and check them in
- Once contact with Air Attack (A/A) is established, 2 will inform Dispatch

The enroute portion of a flight is also a good time to practice and stay proficient in formation flying skills. Good formation skills could save you in the event of flight instrument failure in Marginal Visual Flight Rules (MVFR) conditions due to smoke or haze caused by natural disaster conditions. Good formation flying also increases the efficiency in response times to a fire in a manner like a multi-aircraft Flight "daisy chaining" behind a Lead Plane.

Dauntless Air pilots have the right as well as full authority and the responsibility to turn down a dispatch if they determine that the mission cannot be accomplished without undue risk to themselves or the aircraft. Dauntless Air senior management will support and defend any Dauntless Air pilot who decides to exercise this right. Dauntless Air is authorized to conduct firefighting operations.

FIRE ENVIRONMENT

Dauntless Air pilots will enter the Fire Traffic Area (FTA) in accordance with published altitudes and communication procedures published in the NWCG Single Engine Air Tanker Guidebook. The Lead may check the whole Flight in with Air Attack using the following procedures:

- 12 Mile check-in with Air Attack:
Fire Boss (FB) - "Air Attack 4NC, T851"
Air Attack (A/A) - "Go T851"

FB - "T851, 52, 53, 851 Lead, Flt of 3 FB's, 12 miles south, 6.5, 30.01 set, ready for update."

A/A - "Roger T851, Alt 30.10, enter at 1500, helicopter 87C working 500 and below."

FB - "30.10, 1500, 87C on scene, 851"

Once in the FTA, Dauntless Air pilots are expected to work with other aircrews and aircraft as a cohesive and coordinated group to accomplish the mission at hand. Dauntless Air pilots will endeavor to keep all Flight members, aircraft and any other pilots working in the fire environment safe. Examples of this would be group gear checks, pointing out obstacles in the water or fire environment, and pointing out the locations of other traffic (e.g., helicopter dipping area). The goal is to keep the situational awareness of everyone working in the fire environment as high as possible.

- Position entering FTA - Trail: "Flight go trail" "2", "3", etc.
- Perform pre-drop checks and check-in Flight on Air/Ground (A/G).
- Setup orbit as required (Standard is left hand), Lead make sure to get objective from A/A:
- Hit the heat; target larger columns to reduce energy.
- Stop advancement, i.e. Go after the head.
- Spot control; target spotting outside of the main fire.
- MAKE SURE A/A KNOWS YOU ARE IR EQUIPPED!
- Once the Flt is visual of the target area Lead will pass desired coverage level setting and gate armed confirmation on inter-flight:
 - "Flt set coverage level 6, 1's gate armed" "2's gate armed" "3's gate armed."
 - FB "T851 final, gate's armed, confirm line clear?" A/A "Line is clear, clear. to drop" "851."
- Wingmen mirror Lead's call as required.
- When rolling in on final, each member address A/A with their Tanker number.

Dauntless Air pilots will also be expected to give and receive feedback on drops. The goal is for all aircraft to be as accurate and effective as possible. Dauntless Air pilots should ensure that they are proficient with the Infra-red systems (FLIR) installed in each Dauntless Air aircraft to increase the probability that their drops are as accurate and effective as possible. Dauntless Air pilots have the authority and responsibility to refuse a drop if they feel it may endanger themselves, the aircraft, or personnel on the ground. Dauntless Air senior management will support and defend any Dauntless Air pilot who decides that a drop may be too risky to attempt.

WATER OPERATIONS

Upon arrival at a selected scoop site, the Flight Lead will call for Pre-Scoop Check. He will do this by calling for a check of the top four most critical items to ensure effective and safe scooping in the AT-802 Fire Boss. These include:

1. Verifying that wheels are up for a water landing.
2. Propeller is full forward (1700 RPM).
3. Fire gate is Armed.
4. Fire gate has E-Dump pressure.

A reconnaissance of the selected scoop area will then be performed. All Flight members will look for obstructions, debris in the water, boat traffic, adequate water length and depth, wind direction, and wave height.

Once an area is deemed safe to scoop, pilots will select the water quantity to be picked up based on their remaining fuel. Scooping water should be performed in accordance with the Wipaire Aircraft Flight Manual Supplement (AFMS). However, experience has shown that different flap settings in varying conditions may yield shorter scooping distances and better takeoff performance than calculated in the AFMS. Dauntless Air senior management approves the use of alternate flap settings if no aircraft limitations are exceeded. Dauntless Air pilots will also select a Coverage Level 2 (or higher) on the Fire Gate Control Panel during scooping operations. This ensures that the load can be jettisoned quickly in the event of an aborted scoop. Flight scooping procedures are as follows:

- Once a water source is located.
 - Flt completes at least one orbit to sanitize scooping area.
 - Lead set circuit direction considering wind, terrain, route back to fire.
 - On downwind leg perform pre-scoop checks.
 - Lead calls: "1's handle up, four blue, good pressure" "2's handle up, four blue," "3's handle up, four blue", etc.
 - Recommend coverage level 2 as a minimum for scooping.
 - 1 goes in for first scoop.
 - Allow space for wingmen to set down without getting too close to shoreline or running out of room to scoop.
 - 2 sets the spacing for going on the water considering the following.
 - Wind, water condition, how wide is the source, how long, terrain on approach, wake of previous aircraft.
 - Watch for hazard areas of wake turbulence from preceding aircraft
- Spacing techniques:
- Touchdown after preceding aircraft has lifted off.
 - Allow for 1 minute spacing between touchdowns.
 - If water source is a large lake scooping parallel is possible with following considerations:
 - Stay forward of preceding aircraft's 30-degree line.
 - Minimum spacing of 500 ft.
 - Consider touching down prior to Lead's touchdown in order to liftoff early avoiding his/her wake when loaded.
 - Once the circuit is established.

- Provide A/A with either an "off the water," or "off the scoop" call, and "2 minutes out" or as desired by the AA.
- DO NOT CALL "OFF THE DIP," since that is helicopter terminology.
- If multiple aircraft are involved, and it is necessary to cross flight paths be directive and set an ingress and egress altitude.
- Exp: "Flt, deconfliction altitudes: 1000 ft to the lake 500 ft to the fire, acknowledge" "2" "3."
- Altitudes can be reversed based on situation.
- Ensure this deconfliction is set up even with non-company aircraft.

SAFETY CONSIDERATIONS FOR OPERATIONS IN FLIGHTS

Flying in Flights or Groups of aircraft has proven to be a highly safe and cost-effective tactic in the wildland fire environment. However, these tactics demand excellent formation flying skills and safety considerations if a Flight encounters challenging conditions such as poor visibility where pilots can lose sight of their wingmen. Spacing between aircraft is also an important consideration that also depends on varying conditions, such as water surface conditions, wind, terrain, turbulence, and visibility. Procedures for losing sight of a wingman (Flying in the Blind) and aircraft spacing are detailed below:

Blind (Dauntless Air Aircraft)

- If at any point a wingman loses sight of the Lead or preceding aircraft, call "blind." Lead will then set an altitude or geographic deconfliction plan until visual again:
 - "2's blind (altitude)" "1 copies, visual, at your ----- o'clock high/low/same Altitude."
 - If 1 is blind as well:
 - "2's blind" "1's blind level 500, 2 maintain 1000. 1's circling over the south end of the lake, left hand turn."
 - Keep talking until both aircraft are visual again.
 - If altitude deconfliction cannot be achieved, set a geographic deconfliction and gradually work closer until visual.
 - If more aircraft are involved, be directive with altitudes for everyone.
- Recommend exiting FTA before trying to rejoin Flight if possible.

Spacing: Who is responsible for setting spacing?

- Ensure all aircraft are on inter-flight frequency.
- Calls: Final, Off the drop, On the water, Up.
- Usually use just Off the drop and Up calls.
- Environment determines the calls.
- Low vis = more calls.
- More aircraft = depends on the conditions.....and who you are flying with
- Desired distance: 30 seconds works very well.

Queues...

- Lead turns final/2 turns base.
- Lead drops/2 turns final.
- Lead lifts off water/2 goes on water.
- How to fix spacing?
- Too close: increase distance between aircraft.
- Too far away: must remain within 1 mile to be considered a Flight.
- Get the flight back together.
- Speed vs. Geometry.

Emergency / Unusual occurrence

- Within the flight: Ensure deconfliction, Exit FTA, assess the issue.
- Outside Flight: Inform Air Attack of general issue, exiting the FTA (direction/altitude), standby for further communication.
- RTB / Land immediately/Continue with mission? Error conservatively!

Wipaïre Airplane Flight Manual Supplement for the Air Tractor Amphibian.

SCOOPING OPERATIONS

1.0 INRUN APPROACH

On downwind to scooping site (11,500 pounds, 5216 kilograms):

1. Allowable Scoop Quantity - DETERMINE.
2. Seat Belt and Shoulder Harness - SECURE.

CAUTION!

It is recommended that on all missions involving scooping, a personal flotation device be worn by the pilot.

3. Landing Gear - UP; 4 BLUE LIGHTS.
4. Water Rudders - UP, GREEN LIGHT.
5. Power Lever - AS REQUIRED FOR APPROXIMATELY 100 KIAS.
6. Prop Lever, "P" - FULL FORWARD.
7. Flaps - 10°.
8. Scoop Master Switch - SET.
9. Fill Level Quantity - SET for automatic filling.

On final to scooping site (11,500 pounds, 5216 kilograms):

10. Flaps - 20°.
11. Airspeed - 78 KIAS.
12. Touchdown with power to remain in a slow step taxi.
13. Water Speed - STABLE AT 50-55 KGS (check GPS, if installed).

2.0 SCOOPING

14. Water Speed - STABLE AT 50-55 KGS (check GPS, if installed).
15. Scoop Trigger - SQUEEZE.
16. Power Lever - INCREASE SLOWLY as needed to maintain step taxi.
17. Scoop Trigger - RELEASE in manual scoop mode when desired hopper quantity is reached; unnecessary to release in auto scoop mode.
18. Power Lever - INCREASE TO 4943 LBFT (observe Takeoff ITT and N_g limits).
19. Control Stick - AS REQUIRED FOR NORMAL FLOATPLANE TAKEOFF; expect longer water run at heavy hopper loads.

3.0 OUTRUN CLIMB (16,000 POUNDS, 7257 KILOGRAMS, MAXIMUM)

20. Initial Climb Airspeed - 82 KIAS.
21. Flaps - 10° passing 90 KIAS; 0° passing 100 KIAS.

SCOOPING OPERATIONS

The procedures provided herein for scooping are recommended until familiarity with the airplane suggests modification to any procedure. Scooping profiles are illustrated in Section 5 to provide rough guidance for planning any scooping operations. The profiles should be referred to very conservatively for rough guidance until a pilot is familiar with the characteristics and performance of a specific airplane at a particular location under particular conditions. The scooping operation can be broken into four distinct phases - 1) weight planning; 2) landing; 3) scooping; 4) takeoff.

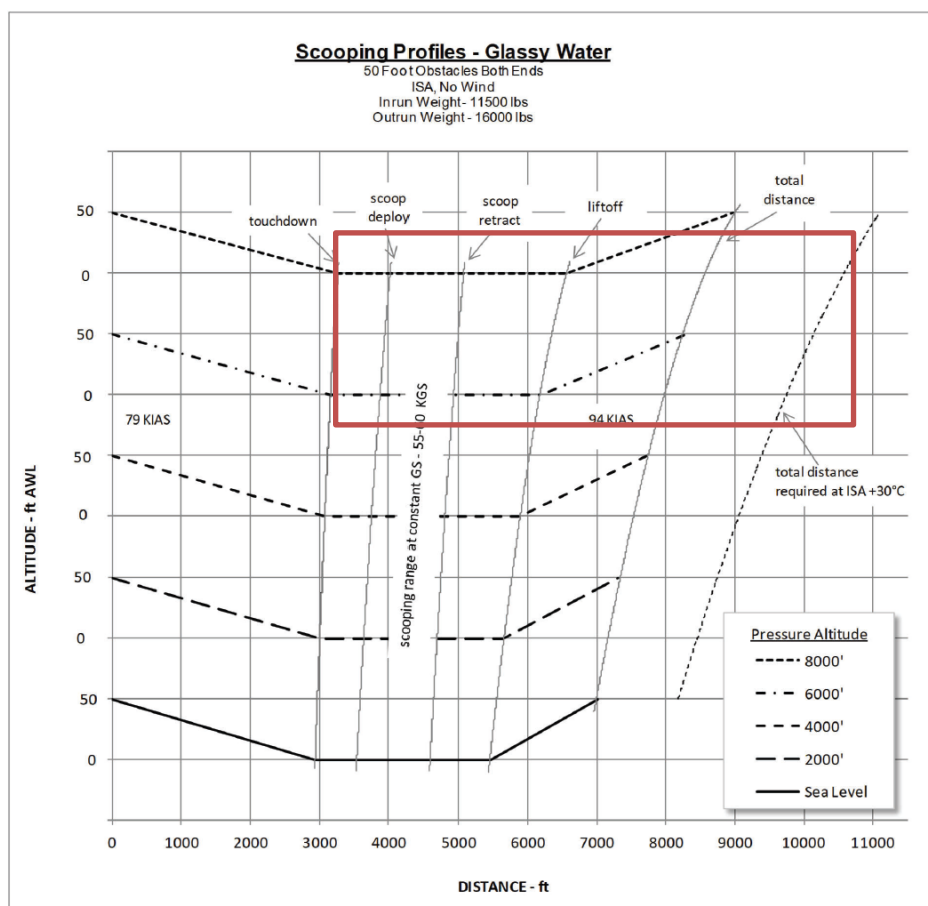
21. Planning - Prior to initiating every scooping run, the fuel totalizer should be referenced to allow determination of airplane gross weight. This will then allow the pilot to determine how much water can be scooped without exceeding the airplane's maximum gross weight limit of 16,000 pounds (7257 kilograms).
22. Landing - On final to a scooping run, a power approach with 20° flaps is recommended. Use an approach speed of 79 KIAS. Reduce power for touchdown to approximately that required for initial step taxi (500-1,000 lb. ft).
23. Scooping - After touchdown, allow the airplane to decelerate to the desired scoop deployment speed. Initially, until familiarity is gained in the airplane a ground (water) speed of 50-55 kts is recommended. A GPS receiver can be referenced for groundspeed. This speed provides for almost transparent scoop deployment. As familiarity with the airplane develops the speed can be increased. At higher groundspeeds, the scoop drag increment at deployment requires anticipatory elevator inputs to avoid a

porpoise tendency. As water is scooped the power lever must be advanced, as the airplane weight grows, to maintain the step taxi condition.

24. Takeoff - At scoop retraction, the power lever should be advanced to takeoff power. The power warning system can assist in preventing excessive over-torque in this regime. A normal floatplane takeoff should be continued from this point. However, expect a longer acceleration distance to lift off at a higher post-scoop weight. After liftoff, an initial climb speed of 94 KIAS is recommended, still with 20° flaps. After achieving a safe altitude and airspeed the flaps may be retracted.

AIRPLANE FLIGHT MANUAL SUPPLEMENT

10000 AMPHIBIAN FIREBOSS MODEL AT-802A



NOTE: 3.281 Feet = 1 Meter

Figure 9: Scooping Profiles Chart.

The performance chart for mission planning scooping is based on a no-wind, maximum gross weight takeoff, International Standard Atmosphere (ISA) conditions, and 50 ft obstacles on approach and departure. Estimated total distance would require interpolation since the density altitude was calculated to be about 6,402 ft, and the temperature was about +17° C above ISA. In addition, the

distance of the approach over a 50 ft obstacle before touchdown on the water, would not be applicable in this event.

25. Additional Airplane Flight Manual Supplement Information:

HELMET LIMITS - A D.O.T. approved or Mil-Spec crash helmet must be worn when operating aircraft. Note: The pilot was found with an appropriate helmet and personal floatation device secured to her.

6.0 INTERVIEWS

The pilots in the accident flight, pertinent flight instructors, Director of Safety, and the Air Attack pilot, were interviewed by the Operations group. A highlight of what was reported:

Pilots in the Flight

Lead pilot:

- They circled around the target area so that everyone understood where the target area was.
- Flight lead went to recon the water, looking for wires and see what the wind was doing.
- It looked like the wind was northwest less than 5.
- The accident airplane lost sight of lead when he came around a corner. (about 5 seconds).
- The lead airplane talked the number 2 airplane on his position and once visual the airplane fell back into trail.
- When lead was in the water and scooping, he realized that there was some sort of tailwind.
- Said there was about 2 miles of lake in front of us.
- Lead came off the water and told the others to abort your loads.
- The number two airplane never responded to the abort call made twice.
- Lead said accident pilot looked fine.
- Limitless visibility in target area.

Number 3 Airplane pilot

- He was hired in March of 2024.
- Verbally, he says we are told if there is any doubt that it can be done safely, do not do it. There will not be any repercussions for not doing something that feels unsafe.
- Said that the scoop was the most challenging maneuver in the Fire Boss.

- From the orbit we descended down to the scoop site, and when we were descending, number 2 (accident airplane) went blind on lead. She got a little low on lead and could not see him and lead talked her to where number 2 could see lead again.
- There was ripples in the water but it was hard to tell which direction the wind was coming.
- It looked like number 2 was essentially right on leads line.
- Number 2's touchdown looked normal.
- When he started scooping the nose came down immediately, which is pretty indicative of a tailwind.
- Lead called for us to jettison and go around, it is a tailwind.
- He saw number 2 kind of make a gentle left turn.
- Again, lead came up and said jettison, it is a tailwind.
- It looked like number 2 was accelerating until it hit some rocks right before hitting the cliff.
- He called lead to inform him that we have had an accident.
- He said this was a very low risk scoop.
- He did a risk assessment before the flight, and it was low.

Number 4 Airplane pilot:

- He was in the accident pilot's training class.
- Scooping is the most difficult part of handling the airplane.
- Use airplane reference points to hold a tight formation or lose one.
- He felt formation flight training was adequate.
- That was planned to be his first live drop on a fire - risk assessment was right in the middle.
- Covered loss of sight in the training.
- Circled in trail and flight lead planned on where to work the fire and a suitable body of water.
- The flight circled the lake and agreed on an ingress and egress, for the scoop.
- Flight lead recognized a sight downwind condition and called for an abort
- He noticed the number 2 airplane did not abort, nor jettison, and then impacted the lake edge shoreline.
- He noticed no change of direction on the water or change in the aircrafts track.
- The accident airplane appeared to still be in the water or very near the surface.
- There was disturbed surface water the entire length of the wing.

- The wake was uniform throughout the scoop until the point of impact.

Instructors:

- Assistant Chief Instructor:
- There was a lot of growth in the company.
- Safety culture was strong in the company.
- Do not do anything you are not comfortable with.
- The company has our back whatever decision we choose.
- Has seen pilots not take the mission.
- Two events in 2020, where there was a misjudgment of the lake size versus the wind condition resulted in hitting the shore on the other end coming, and a sharp veer on the water.
- Initial training is learning to fly the airplane and scoop safety.
- Company training is where formation training comes in.
- Accident pilot had a really good attitude, super nice, and really happy.
- Accident pilot took everything very seriously; she did a lot of studying.
- Accident pilot was the last one to solo in initial, but was not that behind the others, who had started earlier.
- He flew with her on the first ride and for a total of 4 flights in initial.
- He said her scoops were nothing abnormal.
- Said she needed improvement in radio work, and the language barrier was mentioned.

Assistant Director of Operations

- Not a Fire Boss Instructor but a member of the training committee and a line pilot.
- He met the accident pilot in company training and flew with her twice.
- The first time he was flight lead, the accident pilot flew as 3 or 4 with Jacob.
- They knocked it off and returned to the airport because of communications problems - he was pretty sure the accident pilot was having problems getting the FM programmed correctly.
- On the second flight, he took the accident pilot out to do some scooping on a windy day. The water was rough and they knocked it off and went home.
- He also was involved with the accident pilot in the simulator. Said she was a typical student.
- Accomplished about 9-10 hours in the simulator with the accident pilot.
- Our company has always been very good about for whatever reason, sitting out that day with no harm, no retribution, and still going to get paid.

Chief Pilot/Director of Operations

- Have bases in Coeur d'Alene, Idaho, Cleburne, Texas, and South St Paul, Minnesota.
- We do not have a formal risk assessment for a flight; we expect you to do your own based on are we a four ship today.
- The accident pilot had all the qualifications they were looking for and then some.
- The accident pilot excelled in ground school.
- He flew with the accident pilot in initial training about every third flight, so at least four flights.
- She was lagging behind her training class but was showing improvement every time we flew.
- The scooping stuff was not coming to her as quickly as others, but her stick and rudder skills were above and beyond what I seen in the past at some classes.
- We all agreed as a group (instructors) to keep moving forward.
- Keep in mind that the class the accident pilot was with had some very experienced pilots in the Air Tractor.
- In company training, she was flagged as lagging behind the rest of the class in the tactical environment and pulled aside to acknowledge her lagging behind. We assured her that we were not going to give up on her.
- Specifically lagging behind in Situational Awareness and the flight of four thing.
- One of the instructors flagged that she was not ready for tactical or the check ride.
- The accident pilot gained more experience and came back.
- The accident pilot went on quite a few ferry flights practicing formation.
- He did some more flying with the accident pilot including the Mock check ride.
- He felt she was more than qualified after the mock check ride.
- The accident pilot also took flights with other airplanes doing proficiency.

Former Flight Dauntless Air Flight Instructor:

- He flew for Dauntless Air starting in 2019-2024 and was part of their training committee.
- Starting in 2024, he was invited to be an instructor for initial training class that year, that included the accident pilot.
- He was terminated by Dauntless Air on Mar 14, 2024.
- He flew with the accident pilot in initial and company training.

- The Fire Boss is put on contracts in flights of two to four aircraft.
- Mentioned that the Fire Boss is inherently unstable one of the most challenging aircraft he has flown.
- It is a high powered aircraft, so it does have a lot of left turning tendencies.
- It is unstable in the sense that you cannot really trim these hands off and it demand your attention pretty much the whole time you are flying it.
- Every scoop is different and it is impacted or affected by every environmental change, wind density, altitude, other aircraft, the wake, the water itself, so it is very challenging.
- Scooping is the most challenging event.
- You are on the water for approximately 10-15 seconds and then hopefully you are airborne shortly thereafter, ... you also got to climb out sometimes in confined areas or mountainous terrain, which requires a very high level of judgement, skill, and situation awareness.
- Dauntless Air has always touted themselves as a very tight-flying formation organization.
- Ferrying an aircraft provides fairly minimal experience in quality versus quantity, specifically when it is associated with tactical proficiency.
- Said accident pilot came from a diverse background ... thought she was a fairly average on paper experienced pilot coming into the program.
- The FTA part just consists of making a check in and getting established on scene.
- He flew with the accident pilot 10 different times, maybe four times in initial training - I think she was average in terms of flying the aircraft in the air.
- When it came to operating on the water or especially tactical, ... accident pilot was weaker in terms of tactical.
- He noticed on one of the early flights that the accident pilot lost situational awareness on the return back to the airport.
- He believed the accident pilot may have had some of those issues in terms of situation awareness when she ferried an aircraft.
- The accident pilot got more than one specific item she would get overwhelmed easily.
- Accident pilot was constantly studying and absolutely had the right attitude.
- He flew one of the tactical flights with the accident pilot and said she was overwhelmed and he had a discussion with the Chief Pilot and another instructor about her training and what they are going to do since she still is struggling in terms of the tactical environment.

- The decision was made that the accident pilot was not going to fly the rest of the flight schedule but rather ride in the back of the air attack observation platform.
- Basically, the decision was made to get her ready for the check ride.
- He flew with the accident pilot for a total of three flights and she did ok.
- The accident pilot did a satisfactory job enough that he felt like she was going to be safe on her check ride.
- On the next formation tactical flight, she was not only overwhelmed but started to regress in terms of her scooping mechanics.
- The accident pilot did not meet the contractual requirement for the check ride and was able to take the check ride that day.
- He was told his services were no longer needed a few days later by the Chief Pilot.
- He kept in touch with the accident pilot and the class on a group text.
- During questioning, he mentioned a case where the accident pilot just kind of froze on the controls, when joining up on an airplane. He had to take the airplane from her, and she had a startled response.
- He stated that everything went through the Chief Pilot, the recruiting, the hiring, the training, and the scheduling. He said he voiced concerns about not just the accident pilot but the culture in general and that is why he released me.

Other interviews:

The Director of Safety

- Was on the training committee and said the accident pilot was never brought up about her training or anything at the time that he could recall.
- In training, he was the air attack airplane overhead in simulated fire traffic area. - he commented that the accident pilot performed as she should during the training.

The Air Attack pilot:

- Was directing the flight of 4, including the accident airplane.
- Will usually follow them into the dip for a number of reasons: looking for hazards, also where their flight path is.
- Saw them fly in, about 2,500 ft above them, and started scooping.
- Started to lose sight of scooper number 4 and then scooper number 3 as, they were gaining on them.
- Scooper number 4 was right below us when number 2 touched down on the water.

- I saw scooper 1 come in and it was all very normal.
- When scooper number 2 came in and almost immediately I noticed something was wrong.
- The wake the came out was twice as big out of scooper number 2.
- I was not any bigger on the left or on the right, it was even.
- I noticed a nose-high attitude in the airplane; it looked like scooper number 2 was using full power but was gradually slowing down and still had the big wake out of both sides going in the same direction and slowly moving to the left. I do not know if that was P-factor or what but slowly moving to the bank of the left but maintaining the original direction.
- Scooper number 2 close to the bank and started pointing more towards the bank and hit the bank and I think it flipped over.
- He was pretty sure the number 2 scooper did not get airborne again.
- Scooper number 2 touched down in a good position right in the center behind scooper number 1.
- The wind was relatively calm down there and the visibility was good.
- He did not see scooper number 2 jettison the load.

6.0 ADDITIONAL INFORMATION

A review of NASA Aviation Safety System Reporting revealed no similar events by the airplane or type of operation were reported.

In April 2003, the FAA published Advisory Circular (AC) 61-134, entitled "General Aviation Controlled Flight Into Terrain Awareness." The AC highlights the inherent risk that CFIT poses for general aviation (GA) pilots." The FAA defines a Controlled Flight into Terrain (CFIT) accident as one that "occurs when an airworthy aircraft is flown, under the control of a qualified pilot, into terrain ... with inadequate awareness on the part of the pilot of the impending collision."

The AC defined "situational awareness" as the pilot's knowledge "of what is happening around the aircraft at all times in both the vertical and horizontal planes. This includes the ability to project the near-term status and position of the aircraft in relation to other aircraft, terrain, and other potential hazards."

According to the FAAs Pilot's Handbook of Aeronautical Knowledge (PHAK) listed the following operational pitfalls:

Peer Pressure: Poor decision - making may be based upon an emotional response to peers, rather than evaluating a situation objectively.

Getting behind the aircraft - This pitfall can be caused by allowing events or the situation to control pilot actions. A constant state of surprise at what happens next may be exhibited when the pilot is getting behind the aircraft.

Loss of positional or situational awareness - In extreme cases, when a pilot gets behind the aircraft, a loss of positional or situational awareness may result. The pilot may not know the aircraft's geographical location or may be unable to recognize deteriorating circumstances.

Fascination (Fixation) is discussed in the Handbook. "This illusion occurs when pilots ignore orientation cues and fix their attention on a goal or an object...They become fixated on one task and forget to look at what is going on around them." The FAA Aviation Instructor's Handbook in Chapter 3 also discussed fixation. "Fixation occurs when a learner becomes absorbed in performing one task to the exclusion of other tasks."

The company experienced another NTSB accident in 2022 (see attachment 8), NTSB accident number CEN22LA386), where the pilot found it difficult to fill the water tank in rough surface water conditions and decided to abort the scoop run. Subsequently, while attempting to take off, he lost control of the airplane. A weather report from a nearby airport indicated gusty wind conditions. The probable cause was determined to be the pilot's failure to maintain direction control during takeoff from a lake in gusting wind conditions.

7.0 LIST OF ATTACHMENTS

Attachment 1 - Pilot's Documents and Training Records.

Attachment 2 - Weight and Balance.

Attachment 3 - Airplane Flight Manual, SMS, and SOPs references.

Attachment 4 - Accident Formation Pilot's statements.

Attachment 5 - Statements from previous Fire Fighting and Familiarization flights.

Attachment 6 - Formation Pilots, Instructors, and others interview transcripts.

Attachment 7 - Pilot's Handbook of Aeronautical Knowledge and AC 61-134 excerpts.

Attachment 8 - NTSB CEN22LA386 Final Accident Report.

Submitted by:

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