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National Wildfire Coordinating Group

NWCG Standards for Water Scooping Operations

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The *NWCG Standards for Water Scooping Operations* establishes the standards for dispatching, utilizing, and coordinating water scooping aircraft on interagency wildland fires. These standards should be used in conjunction with the *NWCG Standards for Aerial Supervision* (*SAS*), PMS 505, https://www.nwcg.gov/publications/505, and any local, state, or geographic/regional water scooping plans.

As this is the first edition of these standards, the National Interagency Aviation Committee (NIAC) requests review and input into the 2022 revision. Please use the NWCG Publication Review Form, https://www.nwcg.gov/publications/publication-review-form, to submit constructive input into the next version of these standards.

The National Wildfire Coordinating Group (NWCG) provides national leadership to enable interoperable wildland fire operations among federal, state, tribal, territorial, and local partners. NWCG operations standards are interagency by design; they are developed with the intent of universal adoption by the member agencies. However, the decision to adopt and utilize them is made independently by the individual member agencies and communicated through their respective directives systems.

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Dispatch

To increase effectiveness, scoopers should be dispatched in pairs (or more).

Fire Boss aircraft are capable of (and prefer) being ground-loaded before departure. CL-415s and CL-215Ts can be ground-loaded if requested. In the absence of ground-loading, flight crews should pick up water en route to the incident.

Water Source Selection

Upon receiving dispatch, the flight crews will determine closest suitable water source. Coordination between the aircraft manager, flight crews, and local dispatch will vary dependent upon regional water source access protocol. Water source selection may occur en route depending on the geographic area of operations such as Alaska, Washington, Minnesota, etc. Areas of high recreation or restrictive water access should have prior water source coordination setup, and appropriate notifications should be made by the water scooper manager.

The water scooping pilot in charge (PIC) should coordinate separation with aerial supervision and/or other responding air resources depending on the scenario. If necessary, the transition through or around the Fire Traffic Area (FTA) to the water source should be approved or coordinated with standard FTA communication protocol.

Upon reaching the water source, the PIC should survey the water and surrounding area for suitability. The PIC should assess winds, water conditions, length, width, depth, terrain, ingress, egress, natural and human-made hazards, recreation, and aquatic invasive species status.

Winds – Water scoopers typically pick up into the wind. Direction, velocity, gusts, and downdrafts are visible from above during the water source survey and while on the water. Surrounding terrain and vegetation will impact mechanical turbulence and should be considered for the approach, pick up, and climb out. Wind indicators such as white caps, streaks, gusts, cat paws, and downdrafts, give excellent cues to the PIC on expected conditions.

Water Conditions

Factors impacting water conditions include wind direction, velocity, and length of water source. Fetch is known as the distance the wind travels over the water, and will influence wind-driven chop, creating swells given enough length and velocity. Larger water sources are susceptible to larger wave height and possibly swells depending upon the conditions. Smaller water sources with higher winds will not usually develop swells. Narrow water sources may dictate pick-ups with a crosswind component. Water sources with glassy or smooth water have a higher drag component than water sources with wind-driven chop and will yield a longer scooping run.

Length

Distance needed for pick up is calculated per aircraft performance charts and is impacted by aircraft weight, water conditions, winds, density altitude, and available engine power. Length of water source may be estimated by recording the time flown from one shore to another. For example, a 30 second run at 120 knots of ground speed on the GPS will be approximately one nautical mile. Water sources with higher density altitude will produce a longer scooping run due to reduced lift, propeller efficiency, and possibly lower power settings. Higher aircraft weights require a faster liftoff speed and will also increase takeoff distance.

Width

Selection of a narrow water source should be made with consideration given to directional control that may be impacted by crosswinds, poor technique, or mechanical malfunction.

Depth

There are several ways to determine water depth, but the most effective is to survey the water source and surrounding terrain. Water clarity, wave action, vegetation, sun angle, cloud cover, and time of day are a few factors that can enhance or impact ability to judge depth.

Additional resources such as water mapping tools (like Navionics), marine charts, and local knowledge can assist with depth and suitability determination. Visual clues such as boat docks, types of boats moored or operating, vegetation, and wildlife activity can also assist with depth determination. The PIC will consider adequate depth in the event the water scooper needs to reject a takeoff and settle into displacement taxi. Fire Bosses typically require a minimum of four feet of depth and CL-415/CL-215Ts require six feet.

Terrain

Ingress and egress will be dependent upon terrain and obstacles surrounding the water source. Terrain will also impact local wind conditions and may render a water source unusable in certain wind conditions.

Natural Hazards

Examples include but are not limited to daily tidal changes, shallow areas, rocks, debris, and birds. Examples of human-made hazards include towers, powerlines, buoys, watercraft, bridges, surrounding structures, and proximity of airports.

Water scoopers adhere to specific aquatic invasive species (AIS) protocol determined by agency contracts, operator mitigation plans, and local unit determination. The Water Scooper PIC should record the water source used and ensure proper inspection and/or decontamination protocol depending upon regional concerns or specific AIS status of the water source.

Water Pick Up

Depending upon individual operator's standard operating procedures, the PIC will complete a pre-pick up checklist or flow to determine proper aircraft configuration and water system / Radio Data System (RDS) settings. After pick up the PIC should accelerate and climb to an appropriate altitude for transition, considering drop altitude, terrain, and other traffic.

Helicopter and Airport Awareness

When a water source or circuit is near a helibase or airport, flight crews should monitor appropriate frequencies and make position reports as necessary. An effort should be made to avoid overflying helibases and give consideration for impacts on traffic patterns at airports.

Scooper flight crews should anticipate helicopter routes to and from the incident to the helibase and share any communication protocol to incoming scooper flights or relief aerial supervision.

Helibases and local airports may be outside the FTA or Temporary Flight Restrictions (TFR). Scooper flight crews should recognize that these entities may be outside the span of control of the aerial

supervisor. Flight leads should consider delegating helibase or local airport position reports to the second aircraft in the flight to share workload.

Water Scooper Routes and Patterns (Circuits)

The pattern for water pick up, route to the drop area, and pattern for the drop may collectively be referred to as a circuit. Circuit shape may vary depending on distance to the water source, winds, and desired drops. Water scooper circuits are generally into the wind at the water source and form an oval, racetrack, or figure 8 depending upon terrain, aircraft deconflictions, and drop pattern.

Typical Oval Circuit: Can be flown with right or left traffic.

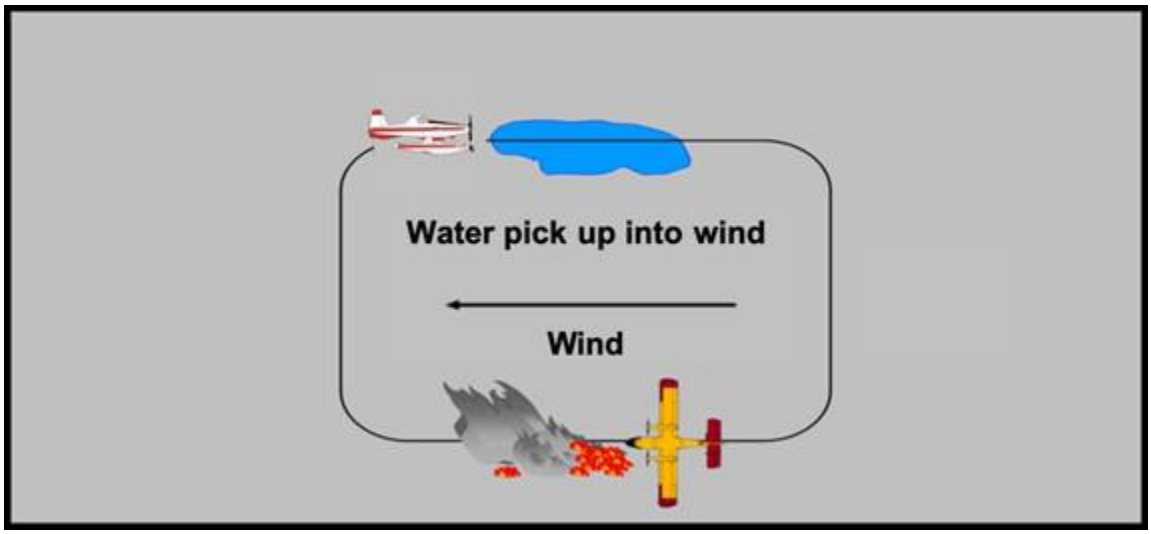
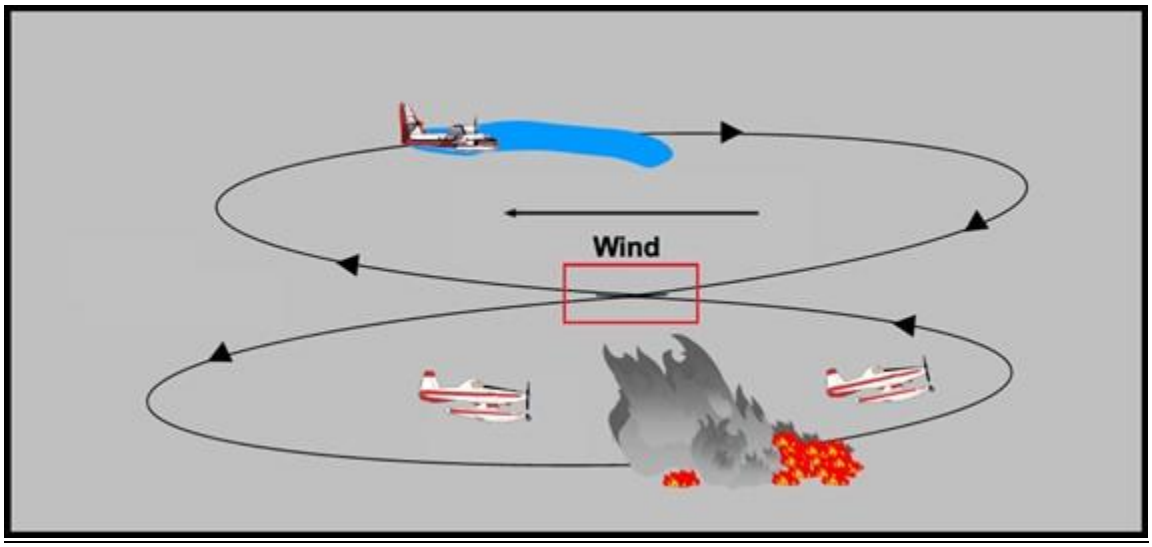
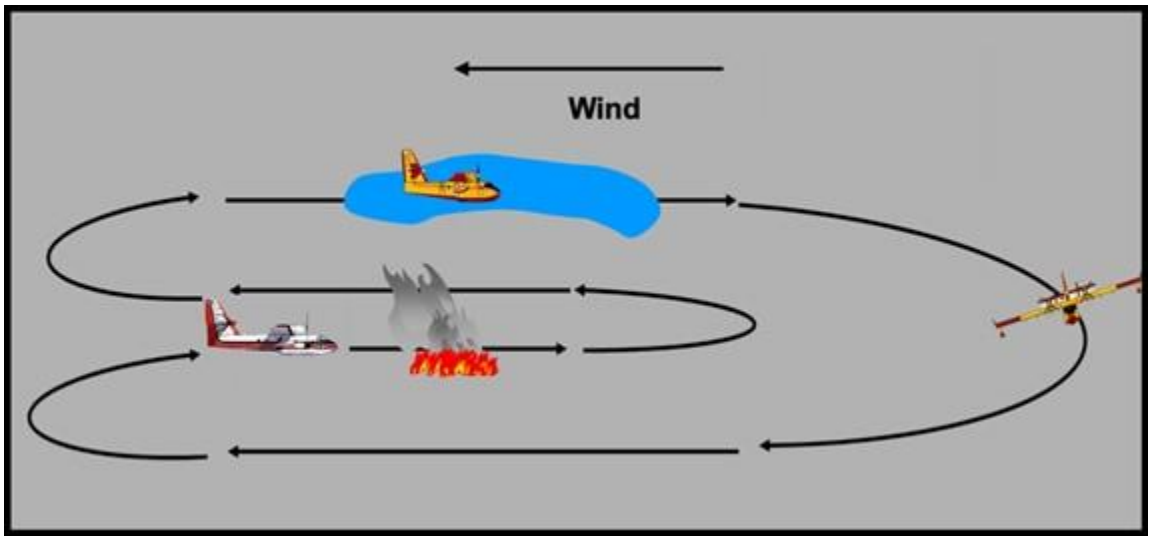


Figure 8: Pick up and drop into the wind. Note conflict area and increased maneuvering.



U Shaped: Pick up and drop into the wind. Note increased maneuvering.



The Water Scooper PIC should coordinate the circuit altitude with aerial supervision and ensure the route and altitude does not conflict with helicopter or airtanker traffic.

Circuit altitude is the maximum altitude a scooper will fly throughout the circuit. Circuit altitude should be established and communicated to assist in vertical and horizontal separation.

When working in close proximity, it is imperative that scooper and helicopter pilots have positive identification of the quantity and type of aircraft. The pilots should also be aware of the other resource's dip/scoop locations, routes, and patterns. Aerial supervision should reference helicopter type (1, 2, 3), configuration (bucket or tank), and/or model (Skycrane, Chinook, Vertol, S- 61, Blackhawk, Huey, 205, A-Star, 407, etc.), as appropriate, when briefing resources. Likewise, water scooping aircraft should be referred to as Fire Boss or Scooper (CL-415/CL-215T) to help positively identify traffic.

Communication and separation protocol will vary depending upon the location of the water source relative to the fire and target area. Water sources within the FTA will yield very fast turn-around times. In that case, an effective practice is to give water scoopers a geographic area and overall objective, and only provide further instruction as necessary. Water sources outside the FTA may necessitate the use of a checkpoint if working with (or sequencing with) other aircraft. The aerial supervisor should ask water scoopers to call off the scoop, off the drop, and call for clearance at the checkpoint. The flight lead and trail aircraft should make passive (blind) and active calls on the radio to enhance situational awareness of all aircraft.

Examples

Passive calls: "Scooper 262 flight, off the scoop," or "Last Fire Boss is off the drop."

Active calls: "Fire Boss 209 flight, is ridge check."

They would then receive a clearance: "Fire Boss 209, flight cleared to target number two behind a Skycrane on the drop," or "Scooper 281, no other traffic. You're cleared unrestricted."

Flights

Aircraft in flights should follow FAA guidance. When operating in support of wildland fires and all risk incidents, aircraft in flights should also follow interagency FTA standard operation procedures.

Water scoopers typically operate in flights of two or more aircraft operating in close proximity to one another with a common objective. A flight lead may be determined prior to the dispatch in some operations. Each aircraft PIC should communicate with other aircraft in their respective flights to coordinate routing, altitude, and speeds en route to the water source.

The group of water scoopers may depart the airport as a flight with ATC or individually and join up as a flight en route. The lead aircraft will be primarily responsible for communications with ATC and aerial supervision.

During the initial transmission to the FTA, the lead aircraft will identify themselves with their scooper number followed by the term flight of and then the total number of aircraft in the flight (i.e., "Fire Boss 209, flight twelve miles west, flight of three"). Following this transmission, the number two aircraft in the flight will identify themselves by call sign and number two and so forth ("Fire Boss 211, number two;" "Fire Boss 212, number three"). Aerial supervision will then communicate FTA clearance to the number one aircraft in the flight for all of the aircraft. Understanding of the initial briefing can be acknowledged by simply transmitting the tanker call sign and should be done in the order of the aircraft in the flight.

Further communications will be given to the number one aircraft in the flight unless specific instructions need to be given to other aircraft. If the same directions are given to each aircraft in the flight, such as tag and extend from the existing target, each aircraft in the flight can acknowledge by transmitting their call sign. If directions are unclear to any aircraft in the flight, the pilot should seek clarification prior to the drop.

Any change in flight status (e.g., scoopers added to the flight [flight of three is now flight of five] or scoopers returning for fuel [flight of three now flight of two]) should be communicated to aerial supervision.

Spacing in Flights

Trailing aircraft should not fly so close as to create a hazard to the aircraft they are following or themselves, whether en route, at the water pick up, and in the FTA. At the water source the lead aircraft should determine a scooping lane considering trail aircraft. For wide water sources with crosswind conditions, the lead aircraft should choose a scooping lane that allows clean air for trail aircraft.

Trail aircraft should scoop on a line upwind of the previous aircraft. For narrow water sources, additional spacing between aircraft may be necessary for wake vortices consideration. The lead aircraft should adjust power settings and patterns to allow trail aircraft to stay with the lead.

Coordination between the trail aircraft and lead aircraft should facilitate safe and efficient scooping operations. Larger flights will require additional vigilance of the lead aircraft, and efficient communications within the flight to keep the flight together.

A general rule of thumb is one-quarter (¼) mile of separation or approximately 10 to 15 second intervals between drops. Spacing should not be so close that a rejected scoop or drop of the aircraft ahead would cause aggressive maneuvering or possibility of collision. There must be enough distance between aircraft to allow aerial supervision to convey updated directions considering the preceding drop or a change in objectives. (See *NWCG Standards for Aerial Supervision* [*SAS*], PMS 505, Chapter 8.)

Trailing aircraft should be close enough to the aircraft they are following to have and maintain visual contact with that aircraft and be responsible for separation.

Multiple Flights

First Flight of Water Scoopers

- Adhere to FTA SOPs concerning radio calls, airspeeds, and sequencing.
- Choose an appropriate water source; survey hazards, ingress/egress, terrain, etc.
- Consider other aircraft routes and advise aerial supervision and other aircraft as necessary.
- Confirm helicopter dip site location(s).
- Commence operations as directed by the aerial supervisor or Incident Commander (IC) or at the discretion of the initial attack-rated PIC if first resource on scene. Advise non-standard patterns.
- Make blind calls (such as "off the lake" and "off the drop") to maximize situational awareness.
- Call for clearance at the checkpoint as directed.

Second Flight of water scoopers

- Adhere to FTA SOPs (same as noted above).
- Fly over water source above established pattern and confirm pick up area used by scoopers.
    - Preferred: Use same pick up area, route, and pattern as previously established ("join the circuit").
- Ensure aerial supervision and IC are aware of additional scoopers on scene.

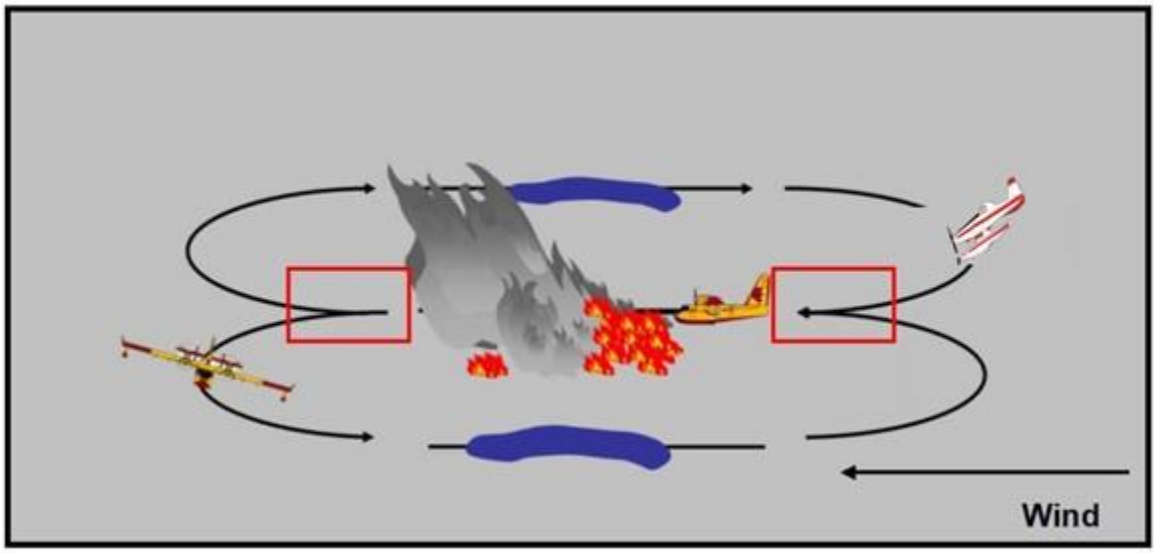
Water Scooper Types

On a short turn-around the CL-415, CL-215T, and Fire Boss operate at similar speeds, therefore spacing can generally be maintained between aircraft in the circuit. Coordination is necessary to ensure no conflicts during the pick up leg and drop leg if aerial supervision is not present.

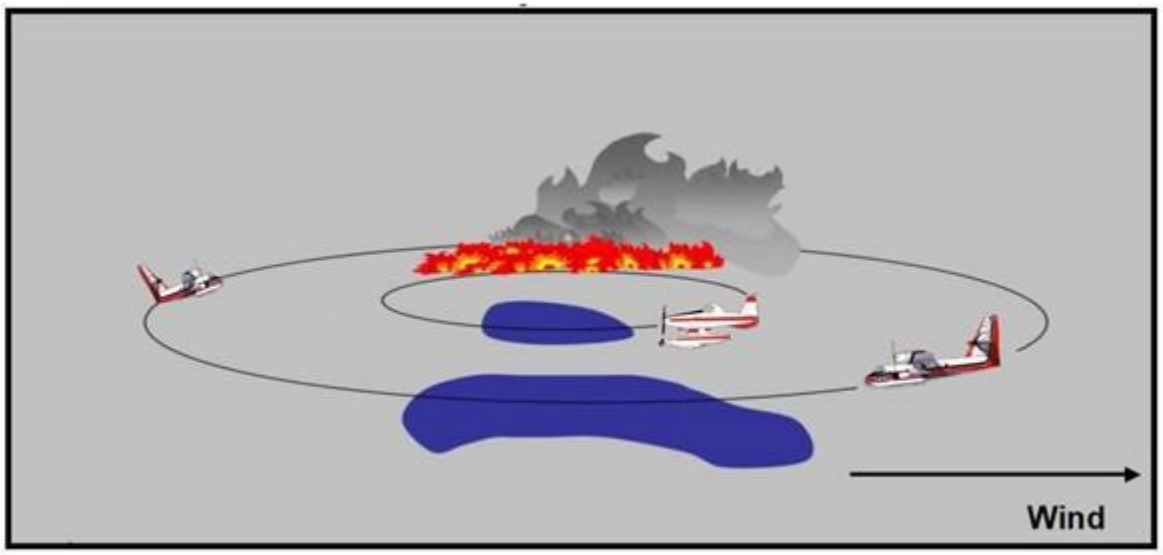
On longer turnarounds the CL-215T and CL-415 will outpace the Fire Boss. The aircraft that is being overtaken has the right of way and the PIC of the overtaking water scooper should give way to the other aircraft by altering the heading to the right. The water scooper crew should advise the slower aircraft and aerial supervisors (as appropriate) of the overtaking maneuver.

*On occasion, experience and comfort levels of each aircraft's PIC may dictate the use of different water sources. This may result in multiple circuits and multiple flights. This is achievable, and at times more efficient and should be briefed with participating flight crews and aerial supervision.

Parallel Circuit: Example of different water sources. Note conflict areas.



Concentric Circuit: Example of different water sources.



Spacing in the Circuit

A safe separation distance should always be maintained when multiple water scoopers are in the circuit. This pertains to both air and water operations. In the event spacing decreases, the faster aircraft should adjust (power or other flight variables) to return the circuit to appropriate spacing. Consideration should be given for maneuvering in the event of a malfunction, rejected pick up, emergency, or loss of directional control. The lead aircraft, or aircraft being overtaken, has the right of way.

The lead aircraft should consider width of water source, obstacles, watercraft, terrain, wind, and trail aircraft when choosing a scooping lane. If possible, the lead aircraft should attempt to leave clean air for the trail aircraft. Subsequently, the trail aircraft should scoop upwind of the lead aircraft to avoid wake vortices.

Hosting Unit

Plans should be made and communicated to flight crews and agency managers prior to arrival to determine:

- Placement of aircraft (at airtanker base or nearby fixed-base operation [FBO] or elsewhere).
- Integration into daily operations (briefings and debriefings at airtanker base or elsewhere).

The *NWCG Standards for Water Scooping Operations* is developed and maintained by the National Interagency Aviation Committee (NIAC), an entity of the National Wildfire Coordinating Group (NWCG).

Previous editions: first

While they may still contain current or useful information, previous editions are obsolete. The user of this information is responsible for confirming that they have the most up-to-date version. NWCG is the sole source for the publication.

This publication is available electronically at https://www.nwcg.gov/publications/518.

Comments, questions, and recommendations shall be submitted to the appropriate agency program manager assigned to NIAC. View the complete roster at https://www.nwcg.gov/committees/national-interagency-aviation-committee/roster.