

United States
Department
of Agriculture

Forest Service



COMPARISONS OF WATER DELIVERY OPTIONS

A Type 3 Helicopter with a long-line and a 75-gallon bucket is often used in support of fire suppression efforts. With a landing area and a water source proximate to the fire, Type 3 helicopters can make rapid and repeated delivery of airborne water.

A helicopter was assigned to the Thirty Mile Fire, and the investigation of the four firefighter fatalities revealed that optimal delivery of the helicopter could have resulted in, at most, a 5-hour improvement in its arrival on the fire. How much water might the helicopter deliver in 5 hours, assuming routine operations?

It takes a few minutes to make a round trip. In this case, this would consist of filling the 75 gallon bucket from the nearby Chewuch River, hoisting the load vertically to a safe distance above the surrounding trees, traveling to an active burning area, delivering the water with as much accuracy and effectiveness as possible, returning to the river and safely descending to the dip site to begin the sequence again. In a 5-hour period it would be necessary to refuel at least once.

Based on the above parameters for the Chewuch River site, a helicopter could deliver approximately 40-60 loads in a 5-hour period. At 75 gallons per load (equal in capacity to two large bathtubs), this would yield a total of 3000-4500 gallons during the period in question (equal gallons to two medium airtankers). The efficiency of airborne delivery of water depends on the limitations inherent in the procedure, and the capability and experience of the pilot. Generally speaking, helicopters deliver a payload all at once, whereas a handheld hose delivers a little water accurately and continuously. This leads to a discussion of the function of portable pumps.

Fire crews also use portable pumps and hoses to provide water. In the case of the Thirty Mile Fire, there were two Mark 3 pumps available. Both could draw water directly out of the Chewuch River, limited only by their capacity, to distribute through hoses directly to the fire. The relatively flat terrain and close proximity of the river to where the fire was burning made this an efficient tactic.

A Mark 3 pump can deliver 15-90 gallons of water per minute, depending on pressure (running at full throttle, a large hose will deliver a large quantity of water, and a small hose or nozzle will deliver a smaller quantity of water, but with higher pressure and an ability to spray the water a greater distance). Thus, with two pumps running for 5 hours at medium pressure (150 psi), the total delivery is approximately 37,000 gallons.

Comparing the two water delivery options shows that portable pumps deliver larger quantities of water with more efficiency than small helicopters. A small helicopter could augment water quantity by about 10 percent over the duration of the 5-hour period in question.

A fire burning 5 acres is consuming 220,000 square feet, which is equal to a city neighborhood of around 10-15 houses plus streets and improvements. A 25-acre fire is consuming over a million square feet or a larger city neighborhood with over a hundred homes and streets and improvements. Thinking in terms of these sizes of areas is one way of understanding what little impact 75 gallons (two good sized bathtubs full) every 5-10 minutes would have on wildfires at these early stages.