



National Museum of Forest Service History Newsletter

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Forest Service Air Tankers

By Bob Carr

Bob began his career as an air tanker pilot in 1956 flying a contract PBY air tanker in Southern California. He moved into the Forest Service in 1959 and served as lead plane pilot in Southern California, with other short assignments throughout the West. After additional training as a helicopter pilot, he became the Central Zone Air Officer at Sonora, CA and then Assistant Regional Air Officer in San Francisco. In 1963 he became the Eastern Regional Air Officer at Milwaukee, WI. In 1973 he became the National Aviation Operations Officer at Boise, ID. He retired in 1985 and now lives in Meridian, ID.

Early History

The air tanker program of today evolved over decades of earlier trials (and errors), mostly done by local pilots and local Forest Service fire officials. Some of these earliest efforts included both free-fall water cascading and “bombing” with containers of water was done in the late 1930s. These experiments determined that uncontained water dissipated so rapidly in the air that dangerous, very low flying was required. The limited load capacity of the available aircraft discouraged trials of larger containers, so further efforts stopped at that time.

Soon after the end of World War II, in 1947, the Forest Service renewed its aerial application trials in a joint project with the Air Force, using military aircraft including 4-engine B-29 Superfortress bombers and single-engine P-47 Thunderbolt fighter aircraft. The B-29s dropped large water bombs with proximity fuses set to explode just above treetop height. The P-47s used both dive bombing and skip bombing techniques to drop wing tanks of water. In both cases relatively good results were obtained on smaller fires, delaying spread until they could be attacked by ground crews. These procedures could not be used on fires where ground personnel were present, reducing the usefulness of this method. The effect on large fires was less encouraging. Much of this work was done in the forests around Missoula, Montana.

In 1948 the Air Force began phasing out some of its propeller-driven aircraft. As jets became more suitable for military purposes, and the Air Force was reluctant to



C-119 Air Tanker

maintain a fleet of obsolescent aircraft and the necessary pilot and maintenance force for further trials on forest fires, not a military mission. For such reasons, the Air Force withdrew from the experiments, leaving many questions unanswered.

In 1953 disastrous fires in Southern California focused attention again on the need to develop new and better ways of reducing the losses by large, damaging fires. These fires inspired what became known as Operation Firestop, which was an outstandingly ambitious and successful research and development program established, in 1954, involving many partners. The Forest Service group included both the (all then-named) California Forest and Range Experiment Station and the San Dimas Equipment Development Center. Other partners included the Los Angeles County Fire Dept., the California Division of Forestry, the University of California School of Forestry and Engineering Research Group, the U.S. Weather Bureau, California and Federal Civil Defense, and several different units from the U.S. Department of Defense. Obviously organizing and managing this large and diverse group took some real skill and dedication. But it worked well in a very short time. It was chartered and conducted as a one-year project. All field work was begun and completed in 1954.

Firestop produced many worthwhile results, many of which have become today's standard practices. For this

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Sustaining	\$300
Organization	\$100
Lifetime	\$1,000

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Museum News

By Gray Reynolds

NMFSH Board and Friends Celebrate in the Nation's Capitol

On May 20th the NMFSH Board was joined by Museum members and friends for the Annual Meeting in Vienna, Virginia and later at a reception at the Hall of States near the Capitol.

Members of the NMFSH Board and Regional Representatives gathered with Museum members, USFS Retirees and Joe Meade, Forest Service Director of Partnerships, to announce plans for the National Conservation Legacy and Education Center and discuss the development of the Center, its educational program and the Museum's collection.

The Collection: Members and guests were impressed to learn that the Museum now manages collections totaling more than 40,000 objects, photographs, maps, posters, journals, documents and books. Dave Stack described the Museum's cataloging procedures for artifacts and documents in the collection. Stack noted that the Museum's acquisition program continues as past and present USFS retirees offer materials for the collection.

Education Program: Jane Westenberger reported that the NMFSH Education Committee is developing recommendations for the Center's education program. The Education Committee is committed to developing a curriculum that goes beyond science or environmental education to include the economic, public policy and social history that defines the conservation legacy of the USFS. Elements of the curriculum will be built around events from the recent past and current work of the USFS. Jane also announced the NMFSH Education Blog, launched this spring by volunteer Matthew Bacon. The blog seeks to engage teachers, educators and the public in a discussion related to the development of the Center's educational programs.

Campaign Update: Tom Thompson reported that the Museum's capital campaign committee has developed a series of white papers to describe the history and relationship of key industries to the Forest Service. These industries include: the ski areas, mining, forest products, wildland fire fighting, oil and gas, recreation and technology. These white papers convey the scope of the story of conservation that the Center will share with the public through interpretative and education programs, on-site, on-the-road and online.

Recommendations of Note: George Leonard recommended that the Museum include or increase its outreach to current USFS employees to capture and share the history that they are currently making. As an example, he suggested exploring the role of the USFS in the aftermath of Hurricane Katrina to tell the story of the contributions by the USFS in recovering from natural disasters.



Al Sample, Pinchot Institute; Board Member Lynn Sprague; and President Gray Reynolds. (left to right)



Jay Farrell of the National Association of State Foresters, Nadine Bloch, Sustainable Forestry Initiative, David Anderson, Boone & Crocket Club. (left to right)

article we will limit our discussion to today's air tanker program, which was only one of Firestop's many products.

Firestop tried both large (for the time) and small helicopter drops of water and chemicals. This led to further work with helicopters, beyond the scope of this article. Among the fixed-wing aircraft used in Firestop was a Navy TBF single-engine torpedo bomber, converted to free-fall drop a 600-gallon liquid load. After numerous trials at various airspeeds and altitudes, careful ground measurements determined that sufficient quantities of liquid over large enough areas could suppress or at least retard most small fires. Other Firestop experiments determined that some chemicals were far more effective extinguishing/retarding agents than plain water, particularly considering the rapid dispersion and evaporation of plain water.

Preliminary findings from Firestop were documented and distributed to potential user groups in the many partner agencies. At the field operational level (Ranger Districts in the Forest Service) not much was known of Firestop or its results in 1955, although some perceptive individuals became aware of the potential of some Firestop results.

Early Operational Efforts

Enter Joe Ely at this point in 1955. At that time Joe Ely was an experienced forester assigned as the forest-level fire staffman on the Mendocino National Forest in Northern California. Joe was also one of the few perceptive individuals who were aware of Firestop results. In the fertile and well-watered Central Valley near the Mendocino are large agricultural areas growing rice, grains, fruits, vegetables, etc. There was a well-established flying service based at Willows, California, that provided aerial seeding, spraying, dusting, and other services to these large agricultural areas. Aircraft used in these services included Stearman and N3N single-engine, bi-wing aircraft, highly maneuverable and well-suited for this low-level work in very tight spaces. Pilots were highly qualified for this specialized work.

Somehow Joe Ely conceived the idea to convince some of these agricultural operators to try applying a liquid cascaded in bulk onto a forest fire. This was somewhat of a reach for some people, including many field-level firemen. After some modification of aircraft drop systems and trials near the airport, Joe and company were ready to try some actual fires. These duster aircraft could carry up to 150 gallons of liquid, depending on the flying conditions. The Mendocino normally has many fires, so it wasn't long until actual drops were made on



TBM Air Tanker (USFS owned) and Borate Mixing / Loading System, Ontario, CA, 1957

actual fires. The results were very encouraging. The bulk cascading of liquids eliminated the very real hazard of containers dropping on people on the ground. Probably (not known for sure) Joe's aerial operators began using chemicals to thicken the plain water and reduce dispersion during the drop.

Joe's successful field trials became known to higher headquarters, and during the 1956 fire season the small fleet of dusters from the Mendocino made many drops on fires throughout California. By this time the chemical material used to thicken water dropped by the air tankers was most often sodium calcium borate, which both thickened the water and had the remarkable effect of fireproofing the forest fuel it was dropped on even after the water carrier evaporated. This allowed building a "fireline" well in advance of a fire - it would last for days. Other chemicals would later replace borate.

Field firemen soon became enthusiastic converts to this most welcome addition to fire tools. Requests for air tankers became too numerous for the small Mendocino fleet of dusters, and more and larger aircraft were needed.

Expansion Of The Air Tanker Program

By mid 1956 it was clear to fire officials that air tankers most definitely could be a great improvement to the fire program. Plans were made to add more and bigger aircraft to the tanker fleet. Potential contractors were contacted and some expressed interest in providing contract services. At the same time the Forest Service acquired some Navy excess property TBM (similar to TBF) torpedo bombers. A few TBMs were converted to carry up to 600 gallons internally. These FS-owned TBMs were to be flown by FS pilots. In 1956, contractor Jim Routh converted a former Navy PBY twin engine high wing amphibious aircraft to carry 1,200 gallons internally. Contractor aircraft were to be flown by contractor-hired pilots. I began in 1956 as one of the original contractor PBY pilots.

See AIR, page 4

By the beginning of the 1957 fire season PBY 87 and I were assigned to the Ontario, California airport together with one of the FS TBMs and a FS bird-dog or lead plane. A primitive retardant mixing/loading system had been put together and we began flying borate to many Southern California fires. We all had a lot to learn, and we tried various methods of retardant delivery. The FS lead plane pilot, Bill Archibald, was a big help in improving our delivery methods.

But the fire managers on the ground had a lot to learn, too. At first, the FS was inclined to delay requests for air tankers until someone on the ground asked for help. This meant that fires were usually well under way by the time we got there. In later years, this would evolve to the conclusion that air tankers were most effective at the very outset of fires, and less so as the fire grew into larger and larger sizes. Radio communications with the ground was also a problem in the beginning. Most often we would have no contact with ground forces on the fire, and we would place our drops as directed by the lead plane, or in his absence as we decided. This too was part of the learning experience. We were good pilots who had to learn fire behavior, etc. on the fly. We also had to learn both mountain flying and low level flying in a fire environment, with erratic air currents, etc. which, again, took some learning on our part. Eventually, we became good at it.

I flew a PBY through the 1958 fire season, but in addition during the 1957 fire season I flew as a temporary, fire-time-slip Forest Service employee for both the Forest Service TBM tanker and as lead plane pilot during the times when our PBY was down for maintenance. In 1959, I went to work full time for the FS as lead plane pilot at Chino, California. By then I had more fire air tanker time than most others, and fit



Contract PBY Air Tanker, Pilot & Author Bob Carr in front of PBY, Ontario, CA, 1957

into the emerging FS air tanker program readily.

During these late 1950s and on into the 1960s, more and more air tankers of various makes and sizes were added to the fleet, including former military propeller-driven F7Fs, C-119s, B-25s, B-26s, B-17s, and others over the years. As the tanker fleet grew, it grew beyond the supervision ability of the few lead planes, so this led to the designation of Initial Attack Pilot for those tanker pilots with enough experience and judgment to select drop targets on their own. These Initial Attack Pilots could also direct other tankers whose pilots were not Initial Attack rated.

As time went on bigger and costlier aircraft added to and replaced the earlier, smaller tankers. From the 1956 100+ gallon Stearman to today's 24,000 gallon Boeing 747s in just 50-some years! Meanwhile, helicopters have also grown greatly in capacity - and cost. The US Bureau of Land Management, some states, and other nations also have air tanker programs. Firestop has many descendants. The future? Who knows.



Volunteers Needed to Visit Museums

Volunteers are needed to visit museums to find innovative new exhibits. We are looking for exhibit ideas and practices that engage diverse audiences, particularly families and children. Information from museum visits will be helpful when we work with exhibit designers developing the final exhibits for the National Conservation Legacy and Education Center. Members interested in volunteering for a museum visit must contact the Museum Office for a list of questions about each museum visited. The volunteer should schedule a visit with the museum's exhibit designer.

Museum members have visited the Newseum, Washington, DC; the Oregon / California Trail Center, Montpe-

lier, Idaho; and others to date.

If you can visit a museum listed below, please call the Museum office. We have very specific questions about each museum visited: Adams Museum & House, Deadwood, SD; Buffalo Bill Museum and Grave, Golden, CO; Chicago History Museum — Sensing Chicago Exhibit; Cripple Creek District Museum, Cripple Creek, CO; Fernbank of Museum of Natural History, Atlanta, GA; Rim Country Museum, Payson, AZ; Panhandle Plains Historical Museum, Canyon, TX; and Park City Museum, Park City, UT.

Capital Campaign Donations

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Elizabeth M. Madison
Tom Thompson

Forest Service History Memorials

Memorials established to HONOR current and former employees, partners and groups since the last newsletter:

Robert Tyrrel — nominated by Janet Tyrrel

Robert served in many positions in the Forest Service including Forest Supervisor of the White Mountain, San Bernardino and Shasta Trinity National Forests.

Forest Service History Memorials honor the living or memorialize deceased persons. For a minimum \$100 donation, we will format the biography and a photo submitted and maintain a record in our Forest Service History Memorial Book and on our web site.

Conservation Education at the Forefront

Education is an integral element of the National Conservation Legacy and Education Center. The NMFSSH board has established a Conservation Education Committee to begin working

with teachers, schools, universities and organizations to shape the education components of the Center's programming.

The committee has created a sounding board for ideas through a conservation education blog. Coordinated by volunteer Matt Bacon, the blog has attracted current and future university and secondary educators and NMFSSH members to join in the conversation. To participate in the blog, contact Matt Bacon m7bacon4@gmail.com.



Joe Meade recommended that the NMFSH consider providing a conservation legacy training programs for USFS employees as part of the USFS leadership academy. He envisioned a program where USFS employees could “walk in the shoes” of their predecessors to address historical challenges and recognize opportunities in USFS resource management. Outcomes would enable participants to learn from the past and to apply their current knowledge and skills.

**Friends and Partners Reception
in Washington, DC**

NMFSH Directors and Regional Representative John Sandor welcomed more than 60 guests to an announcement of the National Conservation Legacy and Education Center. Attendees represented more than two dozen national nonprofit organizations and professional associations, USFS leadership, U.S. Department of Labor, and universities.

Tom Thompson welcomed everyone. Hank Kashdan, Associate Chief, USFS made brief remarks, followed by representatives of co-hosting organizations. Speakers included Greg Schildwachter, Boone and Crockett Club, Sara Gregg, Forest History Society, Derrick Crandall, American Recreation Coalition, and Erica Rhoadé, Society of American Foresters. Thanks to our co-hosts and also to our co-sponsors Anheuser-Busch and Ferraro Cellars for providing beer and wine and Pat Lynch and Western Heritage Company for providing the Conservation legacy partnership lapel pins.

Tom Thompson said “Thanks for coming to learn about the efforts of the National Museum of Forest Service History



Board Member Mark Rey (center) with Erica Rhoadé (left) & Kelsey Delaney (right), Society of American Foresters

build the National Conservation Legacy and Education Center. Our hope is that everyone in this room wants to be a Conservation Legacy Partner with the NMFSH. In the next hundred years every year will be a chance to remember how conservation and conservation leaders have shaped our landscapes and our values.”

Welcome to the Board of Directors: David Parcell, Harris Interactive Vice President of Marketing and Communications, joined the Board in August. David shares a passion for conservation, having served as vice president at the Rocky Mountain Elk Foundation. David will bring his experiences in marketing, sales, communications and public relations to support the Museum’s goals.

Capital Campaign Update

With funds received, proposals and a federal appropriation pending, the capital campaign could reach 75 percent of our goal. We continue to invite individuals, organizations, companies and foundations to join the Museum in building the National Conservation Legacy and Education Center and invite you to make a gift or three year pledge to help us release matching grants now under consideration.

Campaign Goal	\$12.7 million
Committed & In-Kind	\$ 3.3
Pending Decisions	\$ 1.8
Pending Federal Appropriation	\$ 4.5
Total Campaign Activity	\$ 9.6

Repository Corner

PARACHUTE WEDDING GOWN

Lee was a Civilian Public Service smokejumper for the seasons of 1944 and 1945, based at Ninemile and Seeley Lake, near Missoula, Montana, when the whole program of fighting fires in this manner was in its infancy. His experiences as a CO (Conscientious Objector) and in this particular service opportunity, were exciting and character-building.

Lee and Edith met at Susquehanna University in Pennsylvania. When they were planning their wedding, Edith saw a "surplus ad" for a nylon parachute. Knowing how meaningful the smokejumper experience had been for Lee, she envisioned a wedding gown made from a parachute. An obliging sister-in-law, Anna Wegner, spent hours cutting, piecing, french-seaming to make it a reality.

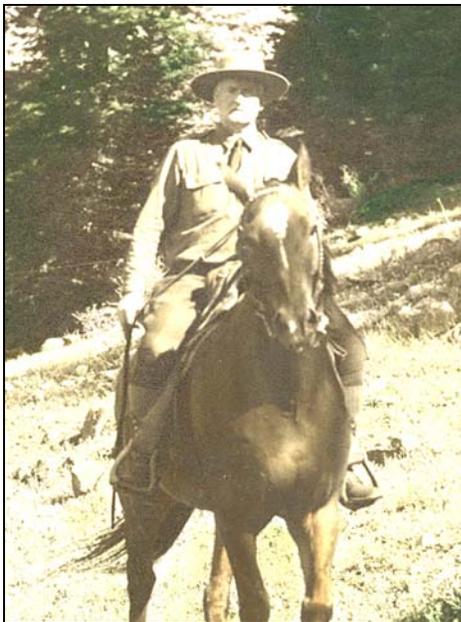
On May 29, 1949, Edith proudly walked down the aisle on the arm of her father, R. W. Wegner, and floated out on the arm of her smokejumper husband, Lee, in her parachute wedding gown!

The wedding dress is in the NMFSH collection.



Edith & H. Lee Hebel

1949



Ranger Smith L. Taylor

McKenzie Bridge District, Cascade
(Willamette) National Forest
Oregon ca. 1928

Richard E. McArdle Collection



Forest Service Chief Richard E. McArdle

Visiting a Rocky Mountain Experiment Station
Unknown Location ca. 1955

Richard E. McArdle Collection



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Missoula, MT 59806-2772

Mr. Ms. Dr. Name: _____ Address _____

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Contributing	\$150 or more		

Volunteers Needed for Albuquerque SAF Convention

Volunteers are needed to staff the joint Museum and National Association of Forest Service Retirees booth at the national Society of American Foresters' convention, Albuquerque, NM, Convention Center.

If you are planning to attend the convention, please help us out. We are planning an exhibit featuring the

Weeks Act Centennial.

The booth will open at 5:30 pm on October 27 and closes at 4 pm on October 29. To volunteer, contact Dave Stack 406-541-6374 or email nationalforest@montana.com. .