



The Forest Fire Warden News

Pennsylvania Department of Conservation & Natural Resources Bureau of Forestry

Perspective

On the afternoon of Friday, February 10, 2023, in need of some perspective, I went to visit Mr. George H. Wirt and his wife, Bertha, at their final resting place, Rolling Green Cemetery, in Camp Hill, PA. In a large cemetery such as this, full of acres of almost identical, flat headstones, George is distinguished only from his companions by the number assigned to him, B569. The thought crossed my mind that this correlates well to what could be considered his final fire assignment: Division Bravo, Order #569 (O-569).

For those not familiar, Mr. Wirt distinguished himself in several capacities with the predecessors of DCNR, first the Department of Forestry, and then the Department of Forests and Waters. He was initially hired in 1901 as the first professional forester hired by the Commonwealth and was assigned as the Director of the Mont Alto School of Forestry.

In 1910, George was summoned to Harrisburg where he began his initial work on wildfire protection for the Commonwealth. At the time, wildfires were one of the most pressing threats to the forest lands of Pennsylvania, burning over 300,000 acres per year at times. Much of the state had been excessively logged and burned, and there was no organization in place to do anything about the situation.

Mr. Wirt did the research and with some assistance from his staff, created the Forest Fire Warden organization and was appointed as the first Chief Forest Fire Warden in 1915 to lead the organization for 30 more years. He ultimately retired in 1946, having seen the Forest Fire Wardens through large fire years in the 1920's, the 1930's, and through the Great Depression and the Second World War. Keep in mind that at this time there were limited staff in the Forest Districts and that local fire departments generally existed only in larger towns or cities.

When we feel challenged, it is helpful to consider what has been done before. The problems we face and the things we need to deal with are not necessarily new, although the situations and circumstances around us may have changed. As we move into another spring fire season, I would encourage all Forest Fire Wardens to focus on the things that have made us successful in the past: communication, cooperation, and an emphasis on firefighter and public safety. I wish you all a safe fire season in 2023, thank you for your service.

Michael D. Kern, Chief Forest Fire Warden

Division of Forest Fire Protection Personnel

Diane Schmidt
Administrative Officer

Charlie Choplick
***Logistics and Finance
Section Chief***

Rick Temple
Fire Cache Manager

Terry Smith
Special Investigator

Brian Pfister
*Wildfire Prevention
Specialist*

Jesse Geiman
***Communication
Section Chief***

Nick Sholly
*Radio Telecommunications
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Vacant
*Radio Telecommunications
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Matt Reed
***Operations and Planning
Section Chief***

Mike Becker
*Qualifications and Training
Specialist*

Todd Breininger
*Prescribed Fire
Specialist*

Chad Northcraft
*Incident Management
Specialist*

Katie Dildine
*Fire Operations
Technician-East*

Jason Williams
*Aircraft Operations and
Safety Specialist*

2023 Pennsylvania Wildland Fire Academy May 30 - June 04, 2023

The 2023 Pennsylvania Wildland Fire Academy will be hosted at Shippensburg University from May 30 through June 4. We're targeting eighteen courses this year, ranging from basic to advanced instruction. As usual, courses may include both classroom and field training. Several classes at this year's academy are planned to focus on incident business and administration.

Following initial registration, student selections will be made based on class size limits, student needs, and agency needs. Registration for courses will open at the beginning of March and run through April 14, when student selection will occur. After that, courses with open seats will remain open until May 19, 2023.

Courses planned to be offered include:

- **Advanced Saws/FAL2**, Field Work to Help Obtain FAL2/FAL1 Qualifications
- **ATVO/UTVO**, Qualification to Operate an ATV or UTV on an Incident
- **DRIV**, Defensive Driver
- **Elsuite**, Introduction to the National Incident Business Management Software
- **FI-110**, Wildland Fire Observations & Origin Scene Protection for First Responders
- **L-280**, Followership to Leadership
- **S-130**, Firefighter Training (Blended) - Field Day ONLY
- **S-131**, Firefighter Type 1
- **S-203**, Introduction to Incident Information
- **S-211**, Portable Pumps and Water Use
- **S-212**, Wildland Fire Chain Saws
- **S-215**, Fire Operations in the WUI
- **S-219**, Firing Operations
- **S-248**, Status/Check-in Recorder
- **S-260**, Interagency Incident Business Management
- **S-261**, Applied Interagency Incident Business Management
- Registration for the following offerings must occur through the local forest district:
 - **Basic - Wildland Fire Crew** [initial training for traveling to out-of-state fires]
 - **FFT1/CRWB On-the-Job Training (OJT)** [limited to existing trainees in these positions]

You may register for one or more classes. All NWCG classes meet national standards, and participants

will receive an NWCG certificate, although a limited number of courses are state and/or agency specific.

There is no course tuition, and all meals and lodging are provided on-site by the PA Bureau of Forestry. Should a student opt-out of the provided meals and lodging, the Division of Forest Fire Protection will not cover the expenses.

For additional information, course descriptions, prerequisites, course matrix, and to register, please visit:

<https://dffp.ticketleap.com/2023-pa-academy/>

Contact your local forest district to register for Basic or OJT.

Warden/Support Crew Weekend Training Event May 19-21, 2023

Location: Seven Mountains Boy Scout Camp located in Centre County.

Address: 227 Sand Mountain Road, Spring Mills, PA

Training Audience: Wardens, Warden Crews and Support Crews.

Fee: None.

Registration: Contact your local District Forest Fire Specialist Supervisor or Fire Forester to register. Registration must be submitted by April 24th.

Check-In: 1730 – 1830 Friday May 19th.

Lodging: Limited to senior Wardens on a first-come first-served basis. This is a field exercise. Support Crews – please bring your own personal tent and treat this as an actual incident.

Equipment Required: Leather boots, leather gloves, Nomex clothing, tent, toiletries, towels, wet weather gear and change of clothing.

Meals: Meals provided all-day Saturday and Sunday thru lunch.

Training sessions will be conducted Saturday morning and afternoon followed by a steak dinner social. Sunday morning, competitive exercises will be conducted with pre-formed teams. All wardens are encouraged to stay and cheer on teams. After the competition, there will be a closeout briefing and awards ceremony. The training event will conclude around 1400.

Nuts and Bolts

In recent years there has been a strong push within the Bureau of Forestry to move toward national (NWCG) qualifications for our firefighters. The notion of assigning a role on a wildfire simply based on a title or job classification is slowly becoming obsolete. For some, this transition is not occurring fast enough and for some it is happening too fast. There is no doubt that the wildland fire service is evolving at a rapid pace. Technology like cellphones and iPads for communication, information sharing, and mapping have become essential tools of the trade. Public engagement in wildfire suppression and prescribed fire is at an all-time high, thanks in large part to social media. An argument could be made that the hazards faced by firefighters are increasing due to the ever-growing wildland urban interface, as well as the increase in tree mortality from forest insects and disease.

As the fire service evolves, we as an organization should also evolve. Having a pool of NWCG qualified firefighters for any given role on a wildfire should theoretically make us stronger, safer, more efficient, more professional, and more competent as an agency. I often find myself wondering if this is actually the case. To be clear, I am in no way arguing against qualifications as a way of bettering and improving our organization but as you all know, there is no equivalent to years of experience.

One could argue that years of experience doing something improperly is not the same as years of experience doing things the right way. Also, there is a strong argument to be made that the national qualification system is designed to incorporate the combination of training and experience. I tend to agree with both arguments, but something still seems to be missing.

After our firefighters successfully complete the basic courses, are they mastering the nuts and bolts of firefighting? Are they given the time to truly learn and perform the basics? I'm not talking about tactics, hazard assessments, GIS mapping or radio skills. I'm talking about truly mastering the very basics of being a wildland firefighter. Sharpening hand tools, setting up porta-tanks, building hose packs, understanding the differences in hose threads and couplings, the list goes on and on. Are we really affording our firefighters the time and opportunity to gain these small but essential skills before moving into leadership roles?

Adam Kling, Fire Management Forester, Tuscarora Forest District



Working with Aircraft

As fire season approaches, it may be a good time to refresh ourselves on working with aircraft on the fire. Every aerial firefighter's goal is to support the firefighters safely and effectively on the ground, but they need your help.

Communication. The pilot needs to know what your operational objectives are. In order to be an effective tool, they need to know what you want to achieve. The perspective from the air can also provide you with valuable information on fire behavior, rate of spread, access, and many other tactical bits of information but in return, they need your help identifying hazards such as powerlines, towers, windmills, other aircraft in the area and any unmanned aircraft operating nearby.

Good feedback. For the drops to be effective, the pilot needs good feedback from the ground resources. Not all drops will be effective, and many things need to be considered when evaluating the result. If the drop did what you expected, then it was effective, if it did not do what you expected, then you need to give good feedback to the pilot so that they may make the necessary adjustments for the next drop. Good feedback on an ineffective drop would include things like the drop was too early or too late, meaning that the pilot punched the load too soon or too late on their pass. Or that the retardant is shadowing on the trees which would indicate that there was too much forward airspeed on the drop or that the drop altitude was too low. The retardant should fall vertically like rain. Other considerations would be wind drift. If the drop misses the target due to the wind drift, inform the pilot so they may correct on the next drop.

Safety. Good two-way communication is the key to safe and effective aerial fire operations.

Jason Williams, Aircraft Operations and Safety Specialist, DFFP

Federal Excess Personal Property

The Federal Excess Personal Property (FEPP) program refers to Forest Service-owned property that is on loan to State Foresters for the purpose of wildland and rural firefighting. Most of the property originally belonged to the Department of Defense (DoD). Once acquired by the Forest Service, it is loaned to state cooperators for firefighting purposes. The property is then loaned to the state forester, who may then place it with local departments to improve local fire programs. State Foresters and the USDA Forest Service have mutually participated in the FEPP program since 1956.

The Firefighter Property Program (FFP) refers to one of the Department of Defense's (DoD) special programs where firefighters can get excess DoD property to be used for firefighting and emergency services. Certain property obtained from this program passes ownership after it has been in use for a specified period. This program is managed by the Forest Service with cooperation of the state forestry agencies.¹



For years, Charlie Choplick, Chief of the Finance & Logistic Section of the Division of Forest Fire Protection (DFFP), has been overseeing the administration of this somewhat overlooked program. FEPP and FFP are excellent opportunities to assist local volunteer fire departments in acquiring usable equipment that often is outside of their financial operating budget constraints. The process is rather straight forward and started by making a request for the type of equipment needed for the department. DFFP's team then screens for available equipment and makes acquisition of the property when located. Cooperative Agreements are drafted transferring "ownership" to the department and user responsibilities are defined.

Michaux State Forest, District 01, was able to utilize this program recently to assist the Northeast Adams Fire and EMS Company (NAFE) in acquiring a Stewart Stevenson

LMTV (light medium tactical vehicle) M1078. NAFE was then able to transform that vehicle into a much-needed type 6 brush engine. The US Army began using the Stewart Stevenson in 1991 after a grueling series of selection trials over a period of many months was completed. It was chosen for its reliability, low run costs, and long-term efficiency. The Army again transitioned to its new family of light and medium tactical vehicles in 2018, making the M1078 readily available through the FFP program.



Northeast Adams Fire and EMS is a merger of two smaller fire departments that were financially struggling to exist independently. The need was present to develop an engine that could handle a diversity of terrain elements and directly respond to wildland fire activities. Fire warden, Dean Shank, sought out the assistance of Michaux State Forest's Wildland Fire Supervisor, Marcus Kaiser, to procure a vehicle to begin such a build. Utilizing the FFP program, the M1078 was located at nearby Letterkenny Army Depot. The vehicle was delivered to the company and the overhaul process began. Body and prep work were donated by company members. The pump and tanks were acquired from a local township. Some of the hose, accessories, and fire tools were provided through DFFP's VFA grants. Final paint was the only major cost incurred. All and all out-of-pocket expenses were minimal.

The FEPP and FFP programs are great opportunities to assist local wildland fire responders with needed equipment at minimum expense. It requires little effort on district level staff to oversee and maintain inventory records and is a great way to repurpose government owned resources.

¹ USDA Forest Service U.S. Department of Agriculture

**Dale Appleby, Forest Maintenance Supervisor,
Michaux Forest District**

Future First Responder Program

The Cedar Mountain Wildfire Crew, based out of Tioga County, recently started working with local Future Farmers of America (FFA) chapters as part of the Future First Responders Program. The FFA is a National Organization that builds leadership in its members and prepares them for careers in Agriculture. The last line of the FFA motto reads, "Living to Serve". FFA members who have chosen to become involved with local Fire and EMS organizations also have the opportunity to join the Future First Responders Program (FFR). The program builds on the FFA ideals of Living to Serve and strives to help lessen the retention concerns faced by many organizations across the country.

Through the Future First Responder Program members not only assist their home organizations with fundraising, training, and calls, but they also work together as a group of FFR to better themselves and the community. These members complete community service projects as a group and attend meetings where they participate in training and leadership activities.



Cedar Mountain Wildfire crew is extending their membership to these FFR as junior members. With help from the Tioga Forest District, the FFR will complete wildland firefighting courses in a blended online/hands-on style format. Students will have the ability to complete L-180, S-190, and S-130 as a Future First Responder with the group of other FFRs. This course will include the field work that goes along with the S-130 course.

The FFR program is also working with the Cedar Mountain Wildfire Crew and DCNR to have these young FFA members participate in community service projects that include cleaning trails, working on the smokey signs around the area, and educating other members about wildland fire safety.



All Future First Responders will keep a record book, known as their Supervised Agricultural Experience (SAE). These record books include all the hours the FFR put into their local fire and EMS organizations, and as the members complete hours they also receive incentives. These incentives include accountability tags, t-shirts, sweatshirts, and even the official FFA jacket.

The Future First Responder Program is new enough in Tioga County that there are still many avenues to pursue. Ideas for the future include incentives to get the members their wildland fire gear, scholarship possibilities, and field trips to learn more about air tankers and support helicopters. These members are also in compliance with the PA Junior Emergency Service Program which establishes standards for all members involved.

Lacy Miles, Cedar Mountain Wildfire Crew, Tioga Forest District



The Pulaski

Just about every wildland firefighter has heard the name Pulaski. It refers to a combination hand tool with a mattock for digging and grubbing on one side and an axe for chopping on the other and is commonly used in wildland firefighting. But do you know who invented it or much about him?

His name is Edward C. Pulaski. He was born in Ohio in 1868 and left school at the age of 15. Letters from an adventurous uncle who wrote vivid accounts of life in mining camps persuaded Pulaski to move west. He was in Murray, Idaho, in 1884 for the gold rush. He worked as a packer, labored in mines and lumber camps, picking up blacksmithing skills. He was married to Emma, and they had a daughter Elsie. In 1908 he was hired by the US Forest Service as an assistant ranger in Wallace, Idaho. He was 40 years old and a seasoned outdoorsman. According to his supervisor, William Weigle of the Coeur d'Alene National Forest, he was a man of most excellent judgment; conservative, thoroughly acquainted with the region and was considered by most in the area to be one of the best and safest men to be placed in charge of a crew of men in the hills.

On August 20, 1910, he was credited for saving all but six of his 45-man crew during what is known as the "Great Idaho Fire" or the "Great Blowup". It had been unusually dry in 1910 and forest fires were breaking out across the northern Rockies. Pulaski was supervising crews on the west fork of Placer Creek, about 5 miles south of the town of Wallace, when the fire suddenly broke out of control and overwhelmed the crew. Going off his knowledge of the area and the dynamics of forest fires, he led his crew of 45 and two horses to an abandoned mine tunnel that he knew about from his mining days. Once there, he made the men lay prone on the tunnel floor. They were choking and gagging from the smoke. Fearing suffocation, a couple of them made their way to the tunnel entrance, Pulaski threatened to shoot anyone who attempted to make a run for it for he knew it would be suicide. When the smoke cleared, five men and two horses had died in the tunnel and one man did not make it into the mine. Pulaski survived with burns to his

eyes, his head, his hands, as well as damage to his lungs. He permanently lost sight in one eye.

In 1911, Pulaski still recovering from his ordeal, created the "Pulaski" firefighting tool in his blacksmith shop and perfected it over the next several years. The tool that still bears his name may have been a direct result of the disaster, as he saw the need for better firefighting tools. Pulaski's version was the prototype for the tool that the Forest Service, by 1920, was issuing to thousands of firefighters and to this day still issues to most wildfire crews. The original Pulaski tool is kept in a glass case at the Wallace District Mining Museum. You can see the weld line where he attached the mattock head to the axe head and the initials "EP" stamped in the side signifying Ed Pulaski's authorship. He thought about patenting his invention but never did. Ed Pulaski died in 1931 and was laid to rest in Coeur d'Alene, Idaho, at the Forest Cemetery.

For decades the tunnel's location was a mystery. It faded into obscurity after the last of the survivors died. In 1979 Carl Richie, a Forest Service archeologist at the Panhandle National Forest, was given an assignment by his supervisor to go see if he could locate the Pulaski Tunnel.



Richie took on the project. He studied old photographs taken shortly after the fire, old mining claims, and surveyor's reports. Through a matter of logical deduction, he was able to find the Pulaski tunnel along the west fork of Placer Creek in October of 1979. Before he retired Richie led about 2 dozen hikes up the creek to the mine shaft and spoke at local chamber of commerce meetings.

Community members lobbied for nearly \$300,000 in federal appropriations to pay for the construction of a trail with interpretative signs telling Pulaski's story.



Today you can walk along the trail to the mine shaft that has become a shrine to 1910 fire buffs, who pay tribute to the capable, quick-thinking assistant Forest Service ranger who saved most of his firefighters during one of North America's worst firestorms.

Source material: *The Spokesman-Review*, *US Forest Service*

**Bryan Wilford, Assistant District Forester,
Buchanan Forest District**

Fire Cache Storage Building

Over the years we have been fortunate enough to acquire with grants, much needed equipment to better serve the Commonwealth and the citizens that live here. Therefore, we have outgrown our Fire Cache storage capabilities.

This is why we are currently under construction of a new 5-bay storage building here on the grounds at the Haldeman Tract of Weiser Forest District. The project should be completed within the next few months, and hopefully useable by May or so of this year.



The storage building will be able to house our Communications Trailer, Mobile Fire Cache Trailer, Drone Trailer for RX burns, new IMT Trailer, UTV and ATV trailers and training trailer.

This will be the best way to keep the equipment out of inclement weather and to make sure everything is in top condition to respond to hazards as they arise.

The project has been a couple years in the making, but when finished will add to the longevity of our equipment and for better security measures.

I would like to conclude with a THANK YOU to our outstanding PA Fire Wardens and all those that assist across our great Commonwealth! We couldn't accomplish everything without you folks.

Rick Temple, PA Fire Cache Manager, DFFP

Time To Think Outside the Hose

As a PA state structural fire instructor for 25 years, I saw the introduction of large diameter hose (LDH). Many fire companies did not understand the hydraulics of the new supply lines, and many argued that two 2-1/2" hoses was equivalent to one 5-inch supply line, after all, $2\text{-}1/2'' + 2\text{-}1/2'' = 5''$. Some argued that the cost was too much. Others argued that on a sloped surface, the additional water in the larger hose and its accompanying weight was too heavy for the pump to move uphill. These "explanations" offered by fire chiefs and other officers, along with township supervisors, was difficult to listen to because they were flat-out wrong. It took a while, but today, most engine companies carry LDH.

The use of LDH was also a simple and cheap way of increasing the efficiency of a small pump on a Type 1 engine. Assume a Type 1 engine had a discharge of 500 gallons at 150 psi. If 2-1/2" hose was used as the supply line, only 300 feet of line could be laid out because this length would consume all the pump pressure with FL (150 psi / FL of 50 psi) x 100 ft). By using 4-inch hose, however, 3000 feet of hose could be laid out (150 psi / FL of 5 psi) x 100 ft). Using 5-inch hose would lengthen the hose lay to 8800 feet (150 psi / FL of 1.7 psi) x 100 ft). The usefulness of the pump was extended by the use of hose! NOTE: The previous figures used all the pressure to solely

move the water the calculated distance over flat ground.

After taking and then teaching the S-211 course for some time, it became apparent to me that the wildland firefighter is in the same predicament as the structure firefighter in the late 70's and early 80's when addressing supply or trunk line size. The 1-1/2" hose is the trunk line in use today and hydraulically makes no sense for moving appreciable amounts of water long distances or up steep slopes. Arguments to support its use parallel that of the structure world 40 years ago. As a structure fire instructor accustomed to a throttle and gauges, a pump that ran without, at least, a pressure discharge gauge, made no sense since you had no idea of the flow. In the structure world, various formulas exist for determining fire ground water flow rates based on the size and extent of the fire, thus allowing an officer to determine the amount of water required for extinguishment and then order up the pressure and hose lines to accomplish the job. Why is it any less important to supply known quantities of water on wildfires?

The argument for the use of 2-1/2" trunk line is based on hydraulics and, if we want to move more water, hydraulics must govern. In S-211, under "Advanced Pumping Techniques," methods, to move more water, such as parallel pumping and parallel hose lays, are taught. But once the lines are joined by a gated wye, the friction loss increases by 4, so what you gain at one location in the pump set-up you lose in another. These methods require additional 1-1/2" hose and/or pumps, which are not always available. Using a larger trunk line eliminates these "Advanced Pumping Techniques." Additionally, when long lays and/or substantial elevation is involved, series pumping provides more flow than parallel pumping.

I am not proposing the elimination of all 1-1/2" hose but purchasing 2-1/2" hose to replace some of the retired 1-1/2" hose makes sense. It is interesting to note that back in 2000, a research project was initiated between the Ontario Ministry of Natural Resources, Aviation, Flood and Fire Management Branch and Mercedes Textiles LTD to test the use of 2-1/2" hose. Hose lays extending up to 5000 feet over various terrain types, along with the use of sprinkler kits, helicopter deployment of hose, etc

were tested and the results were overwhelmingly in favor of the 2-1/2" hose over the 1-1/2" hose.

Let's look at numbers. The area formula for a circle is πr^2 . For 1-1/2" hose, the radius is .75 in ($1.5" / 2$). Substituting into the formula produces an area of 1.77 in^2 ($3.14 \times (.75 \text{ in})^2$) or rounding to 1.8 in^2 . The 2-1/2" hose has an area of 4.9 in^2 ($3.14 \times (1.25 \text{ in})^2$). Comparing the two indicates that the 2-1/2" hose has a surface area 2.7x larger ($4.9 \text{ in}^2 / 1.8$) than the 1-1/2" hose, or stated another way, it takes three lengths of 1-1/2" to equal one length of 2-1/2" hose.

Examine this Friction Loss Comparison Chart – Red Friction Loss Calculator (psi / 100 ft)

GPM	1-1/2"	2-1/2"
10	0	0
20	1	0
30	2	0
40	4	0
50	6	.5
60	9	.7
70	12	1
80	15	1
90	19	2
100	24	2

Comparing the friction loss values for 1-1/2" and 2-1/2" hose at a flow of 100 gpm, indicates that the FL for the 2-1/2" hose is 12x less than that of the smaller hose ($24 \text{ psi} / 2 \text{ psi} = 12$). Note: Some of the friction loss values for the 2-1/2" hose were rounded up, so it appears that the 12 to 1 ratio is not consistent for all friction loss values. This means that it is possible to lay 12x as much 2-1/2" hose as 1-1/2" hose for the same friction loss value (same flow rate) so 1200 feet of 2-1/2" hose equals 100 feet of 1-1/2" hose. This concept is known as equivalent hose length.

If we use the new "Green Friction Loss Calculator", the friction loss for 100 gpm through 1-1/2" hose is 35 psi and 100 gpm through 2-1/2" hose is still 2 psi. Using these numbers, the difference is more dramatic, 17.5, meaning that 100 gpm can be moved 1750 feet through 2-1/2" hose compared to 100 feet of 1-1/2" hose.

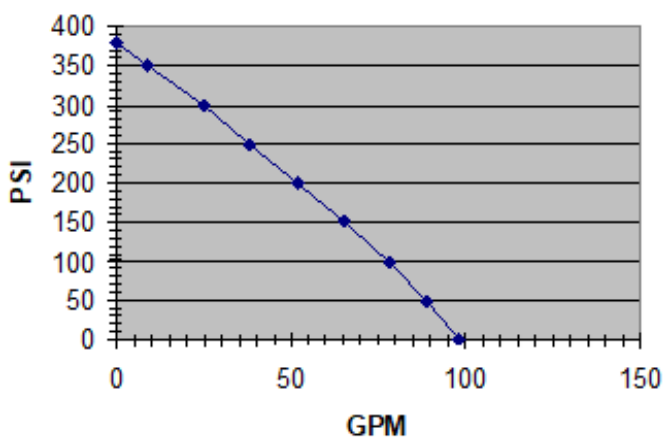
In terms of head pressure, hose diameter has no bearing on the resulting pressure. That means that the head pressure is the same for the 1-1/2" hose and the 2-1/2" hose. To prove this, one must distinguish between force and pressure. Force is a push or a pull, gravity is the force and the weight of water expressed in pounds is the force. Pressure

requires both a force and an area. Comparing the areas as calculated above and using a standard hose length of 100 feet allows us to calculate the weight of the water in the hose. For the 1-1/2" hose, area x length equals 1.8 in² x 1200 in (100 ft x 12 in / ft) or 2160 in³. Since 1 gallon of water occupies a volume of 231 in³, it is possible to convert 2160 in³ into gallons by division (2160 in³ / 231 in³) which yields 9.35 gallons of water. Water weighs 8.3 lb per gallon, so the total force in the 1-1/2" hose is 77.6 lb. This force is distributed over an area of 1.8 square inches, so pressure is Force / Area; 77.6 lb / 1.8 in² or 43.1 lb / in² for the 100-foot length or .43 lb / ft². Following the same process for the 2-1/2" yields 25.5 gallons with of force of 212 lbs distributed over an area of 4.9 in² and a pressure of 43.1 lb / in² / 100 ft or .43 lb / ft². Hose size has no effect on head pressure! This is why you always place the largest diameter hose on the slope. The reduced friction loss values of the larger hose offsets some of the head pressure and allows for a greater discharge on a slope.

Arguments for not using 2-1/2" hose are based on its weigh and cost. Back in the day, when brass couplings and doubled jacketed hose was the norm, it was substantially heavier. With today's synthetics and aluminum couplings, the weight has been drastically reduced and comparing the cost of 3 sections of 1-1/2" to 1 section of 2-1/2" makes the 2-1/2" hose the better choice financially and hydraulically.

To get an idea of the discharge from a centrifugal pump, manufacturers provide pump a performance curve. For the Mark III, the curve looks like:

MARK III Performance Curve



This graph only shows the relationship between head and flow. You cannot look at a given GPM and find its associated PSI value and expect that flow to occur. For example, if you look at 50 gpm and extend a vertical line from this point upward until it intersects the performance curve, the pressure is about 200 psi, BUT these curves do not take friction loss or nozzle pressure into account.

A better way to determine fire ground flow is to calculate a system curve. To do this, you specify the parameters of the pump setup from start to finish and then plot the numbers on the performance curve graph. The intersection of the two curves gives the pump operator a more realistic view of actual discharge and related pressure. Assume you have a pump located 5 feet above the water source, a 2-inch x 10 feet suction hose, 1500 feet of 1-1/2" hose laid on a 20% slope (300 ft rise) with an open butt end (NP = 0 psi) as in filling a pumpkin. Working the numbers for suction hose lift and FL, along with nozzle pressure and the head pressure value, gives a base value, to which is added the FL values from 10 gpm to 100 gpm through 1530 feet (slope distance is greater than map distance) to produce a set of numbers that will be plotted on the pump performance curve. The intersection point is around 47 gpm @ 217 psi. This gives a much better idea than using the Pump Discharge Formula, which includes Nozzle Pressure, Friction Loss and Head Pressure. After doing the calculations you compare the resulting pressure and associated gpm to the Pump Performance Curve. If your numbers fall within the psi / gpm values, then the setup is hydraulically feasible, but you still don't know specifics.

Using the same pumping parameters as above but substituting 2-1/2" hose produces a flow of 66 gallons at 147 psi. The reduced pressure also means that single jacketed hose with a service rating of 300 psi would work, thus following some manufacturer's recommendation not to exceed 90% of the service rating.

This article was meant to stimulate thought based on hydraulics and the greater benefit of using a larger diameter trunk or supply line. Pre-incident identification of critical factors, such as topography, fuel type/load, demographics and water sources, allows us to prepare for scenarios such as a Wildland

Urban-Interface situation or when pumping up long steep slopes. Brainstorming various portable pump configurations, along with the integration and training of engine(s) (both wildland and local fire-companies) allows for the development of an efficient plan of attack when a fire event occurs.

To turn a deaf ear to moving greater volumes of water using larger diameter hose with current pumps is akin to the arguments used by the structure people 40 years ago, and, quite frankly, the current arguments won't hold water either! Tradition or "this is the way we always did it" is not a valid reason to continue these practices. Folks look to us as experts in our field and expect our best when there is a wildfire. In terms of water movement, it is about time we moved into the real world of efficient hydraulics.

Bob Llewellyn, Forest Fire Warden / Retired State Structural Fire Instructor, Weiser Forest District

Wildland Fire Leadership Award

The 2022 recipient of the Wildland Fire Leadership Award is Terry Smith.

With a career spanning more than 30 years, Terry has served in various roles for DCNR, from working in the wildlands of the Bald Eagle Forest District, to serving as the Lead Wildfire Investigator for the Commonwealth.



During that expanse of time, responding to thousands of incidents, Terry evolved to become a leader in the wildland fire program. His command-presence and humility serve to reassure incident responders during stressful situations.

Working with thousands of personnel over the years in the fire program, no one is more genuine and willing to help people than Terry Smith.

There are several factors that drive individuals toward working in public safety, and for Terry, it is helping people in their time of need. Terry is always willing to step up and lead or help with in any role he is needed.

For more than 30 years, Terry has been a selfless, patient mentor to generations of staff, volunteers, and countless others.

Congratulations Terry!

Arthur N Creelman Memorial Award

The 2022 recipient of the Arthur N Creelman Memorial Award is William Deaton. Bill is a Semi-Skilled Laborer for the Delaware Forest District and has worked in the wildland fire program for quite a few years. He is an instrumental part of the fire program.



Bill has increased our presence with school programs, preschool through high school. He has also handled the bulk of our programs and outreach, and he took on the district Facebook page and gets a great message out. Bill is currently working on his qualifications for wildfire prevention for out-of-state assignments so he can spread the message.

Congratulations Bill!



pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

Years of Service

Please congratulate the following Wardens for their 50+ years of service.

Dist	Name	Year Appointed	Years of Service
05	Ronald T Pawlowski	1957	65
08	David L Steward	1957	65
18	Kenneth Parrish	1957	65
01	Howard E Kelly Jr	1962	60
07	Robert F Laubach	1962	60
09	Sheldon L Sharpless	1962	60
15	Paul A Buchsen	1962	60
02	David B Williams	1967	55
02	Ralph D Mellott	1967	55
09	Andrew Pillot	1967	55
09	Wallace E Finn	1967	55
14	Charles C Thompson	1967	55
15	Kenneth J Wingo Jr	1967	55
01	Philip L Wert	1972	50
02	Richard W Fuller	1972	50
03	Glenn E Bell	1972	50
03	David A Kell	1972	50
07	R Alexander Day	1972	50
08	William I Reinard	1972	50
09	Edward A Richards	1972	50
17	John G Miller	1972	50
18	Larry L Newswanger	1972	50



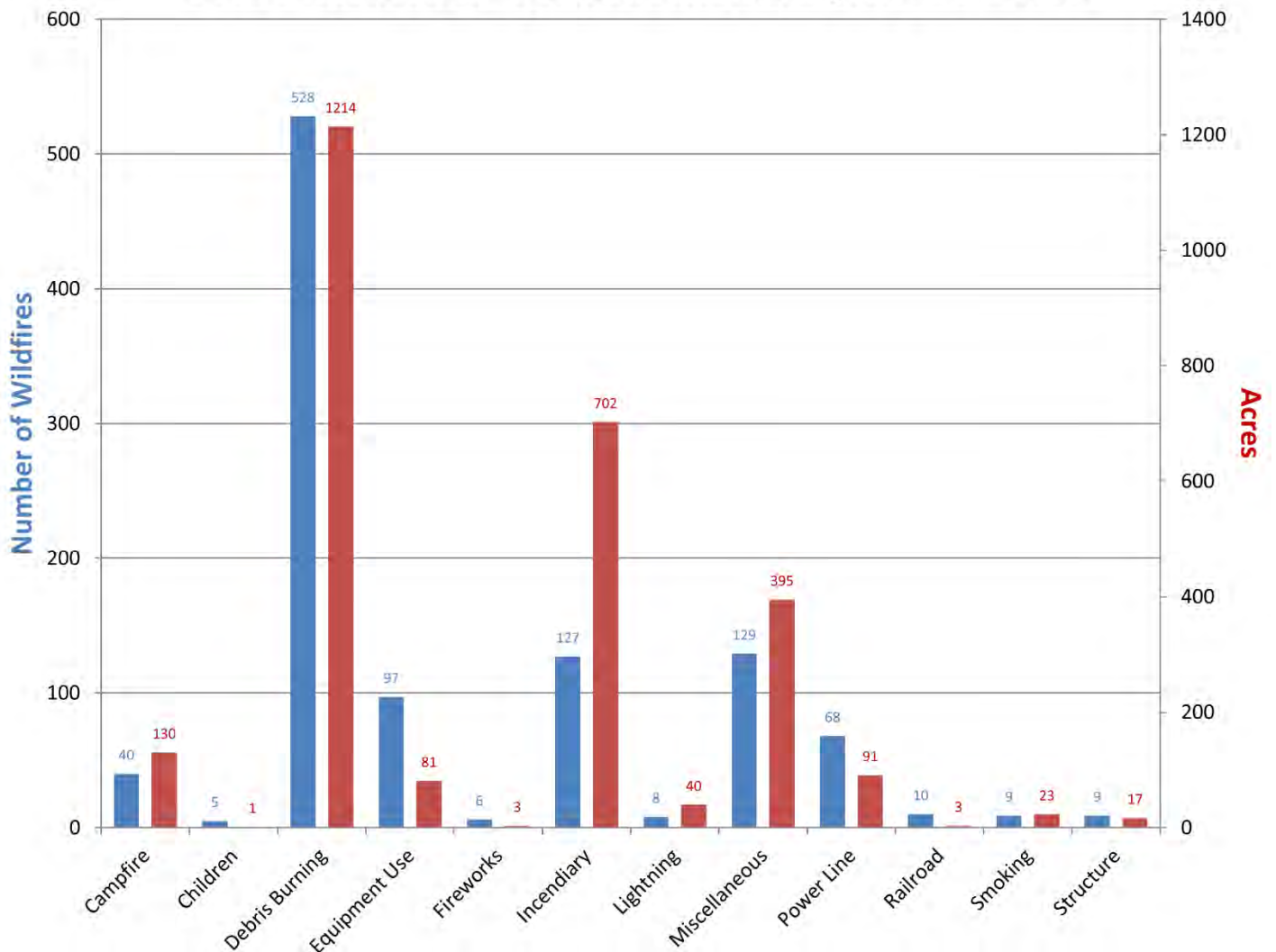
In Remembrance

Wardens who passed away in 2022

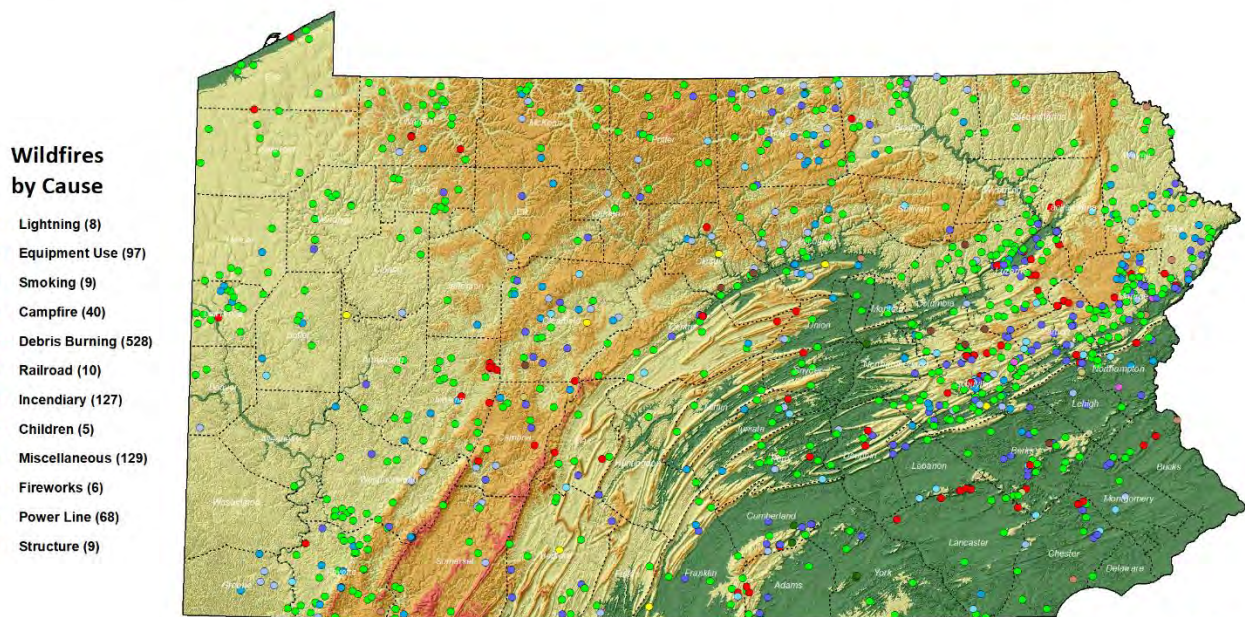
Dist	Name	Year Appointed
01	Edward L Baker	2001
01	Ivan R Bretzman	1970
01	Richard C Hartman	1961
01	William F Vanidestine	1961
02	Arnold R Hann	1977
02	E Gary Scott	1960
06	Theodore Partsch	1968
08	Leonard L Hoffman	1966
08	Gerald A Lauer Sr	1971
09	Melvin F McLaughlin	1977
09	Wayne Wynick	1978
10	Richard L Biggans	1983
10	Harry M Lord	1997
11	James E Howley	1977
11	T Adrian Prokarym	1967
14	Don E Bellinger	2011
14	Gerald B Boughner	1973
14	Thomas D Erdman	1981
14	Donald L Kunselman	1973
14	Christopher L Pontius	2002
17	Gary A Small	1989
18	Robert M Coy	1956
18	Robert Wariki	1983



2022 - Number of Wildfires and Acres per Cause Class



2022 - Pennsylvania Wildfire Occurrences reported to DCNR



1,036 Wildfires / 2,700 Acres



The Forest Fire Warden News