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DNR Wildland Firefighter

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Western Washington University

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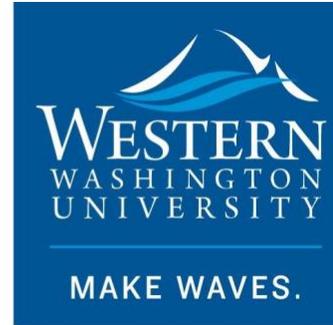
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COLLEGE OF THE ENVIRONMENT



Internship Title: 2021 DNR Wildland Firefighter

Student Name: David van Tulder

Internship Dates: 06/17/21-09/20/21

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STUDENT SIGNATURE:

A handwritten signature in black ink, enclosed in a hand-drawn oval. The signature reads "David van Tulder".

DATE: 06/10/22

Lessons From the Department of Natural Resources
WWU Senior Internship Report



East Beach rd. Fire (original)

David van Tulder
ENVS 498B
Advisor: Grace Wang
06/17/2021

Intro

From June 16th to September 20th, I worked as a Firefighter Type 2 and Firefighter type 1 trainee on E-1101, see image 1, for the Olympic Region of Washington's Department of Natural Resources (DNR). I began this internship as a first step into the complex organization that is the DNR to better understand how it interacts with local social and environmental systems. As part of the DNR I have hoped to learn their inner machinations, think big picture about socio-environmental-economic system in fire, and to gain concrete experience and skills for future work.

I am grateful to the Olympic Region DNR for giving me this learning opportunity. Through them I gained not only the hands-on skills of tool use but also critical thinking skills, active communication, in depth analysis, and systems thinking. Working for the DNR provided an opportunity to practice many of the skills I have learned at Western Washington University (WWU). Within this report I will address each of the lessons I have learned from the DNR by detailing job tasks, anecdotes of operations, and reflection on class concepts. My job tasks will be separated into two sections: daily operations and fire line duties.



Image 1: E-1101 (original)

Daily Operations

Preparing for the fire, or stand-by, encompasses most of our time. Preparations include some training similar to any general government employee: human resources trainings, Credit card trainings, and even lessons on the safe operation of a printing machine. The training began with a basic physical test required for hiring, then basic firefighter training and continued everyday through routine gear and mental checks.

A day without a fire response would follow this general schedule. Note: activities may include travel time to and from location.

0900: Rig check

- Engine crew will ensure proper functioning of vehicle engine, tires, suspension, electrical system, and water pump through visual and/or technical inspection
- Engine crew will take inventory of all tools on engine for potential fire assignments

1000: Briefing

- Engine crew lead runs through planned and potential tasks of the day
- Engine crew checks weather and discusses its possible impacts on fire behavior
- Engine crew discusses the safety topic of the day

1100: Brushing project

- Engine crew navigates to an assigned plot of DNR land and completes one or multiple of the following tasks:
 - Tree thinning: reducing young trees to increase fuel spacing
 - Road clearing: removing branches and/or trees impeding a logging road see appendix B.
 - Hazard tree removal: Under the guidance of a level B certified sawyer, crew may identify dead or diseased trees and either flag for removal or remove them.

1200: Lunch

1230: Brushing project cont.

1430: Firewatch

- Engine crew ceases all use of chainsaw or other fire hazards and remains on site to ensure no fires are established

1430: Training

- Engine crew reviews topics and skills relevant to the job:
 - EMS/first aid
 - Problem solving scenarios
 - Radio communication
 - Weather reading and interpretation
 - Navigation
 - Hose lays
 - Pump operation

1600: Tool maintenance

- Engine crew completes any of the following tasks to ensure functioning condition:
 - Cleaning
 - Sharpening
 - Removing burrs
 - Repainting
 - Replacing handles

1630: End of Shift

Fire Line Duties

In this section I will discuss fire line duties in three stages: response, attack, and mop up. Each step uses skills which can then be discussed further on in this report and then taken to future employers.

Response

Once an in-district fire assignment has been given the fire crew has 45 minutes to arrive on site. This is due to the large area in which each engine covers. Our district covers all DNR lands on the Eastern side of Jefferson County (See image 1 below). Our engine was centrally located but it would still take about 30 minutes to drive to either of the borders. That left us with 15 minutes to prepare.

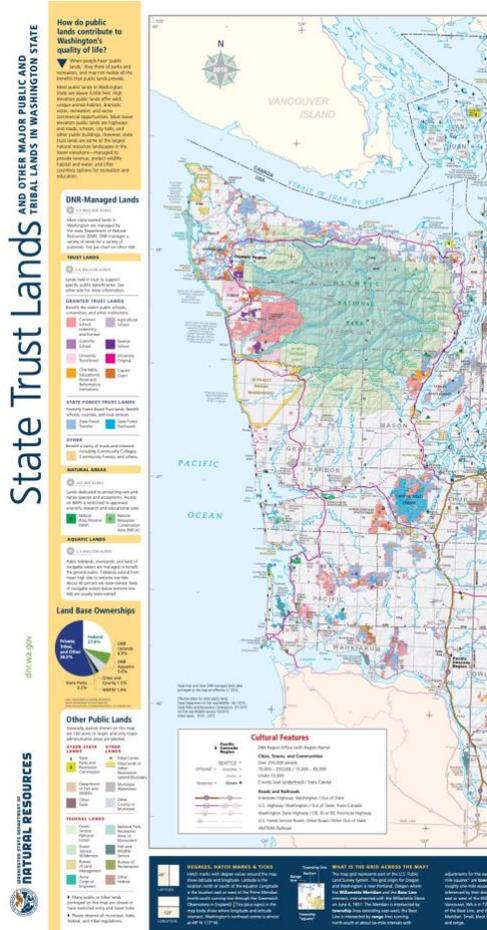


Image 2: Map of State and federal lands on Olympic Peninsula (DNR, n.d) <https://www.dnr.wa.gov/programs-and-services/buy-maps-aerial-photos-or-survey-data>

All equipment is stored in a ready to go manner. Therefore, the main things needed before leaving the station are identifying location, which resources are there, fire size, and any hazards we may encounter upon entry. Following gathering information, we leave the station and notify our dispatcher of our resources, destination, and time enroute to the fire. This process should take under a minute but is not subject to regulation.

Attack

Upon arriving at a fire our engine crew starts by reporting to an incident commander, if there is one, or gathering information from the reporting party and establishing an incident command. Following this we commonly follow the strategy: “Anchor, Flank and Pinch” as seen in image 2. This means finding an anchor point where fire cannot burn through, then flanking the fire by extinguishing along one edge and finally pinching by meeting at the head of the

fire with another firefighting engine or single firefighter working the opposite edge of the fire.

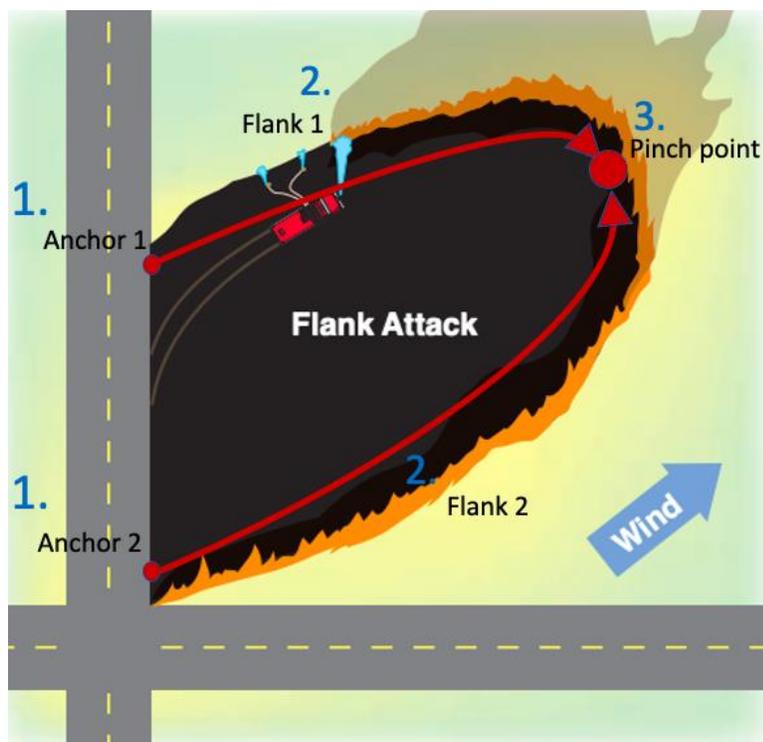


Image 3: Anchor, Flank and Pinch Tactic source: (IFSTA, n.d.)
https://www.ifsta.org/sites/default/files/GC_Ch_4.pdf

In order to accomplish the goal of extinguishing the fire we may use several resources including Hand crews, bulldozers, air attack depending on the intensity, speed, and size of the fire.

Mop up

Following extinguishment of the fire we start mop up which consists of checking every inch of the fire for remaining heat. This is accomplished by gridding, a process in which the entire fire crew, consisting of possibly multiple engines, lines up and looks, listens, and feels for heat as they walk across the burnt surface of the fire. This process is grueling but ensures no heat is hiding below ground only to escape later and reignite the fire. Under the right conditions, such as a dirt berm with little pockets of air and woody debris, fire can stay underground for months. Left unattended, a new fire could reignite once the firefighters have all left for home. This is why proper mop up is essential.

Notable occasions

Sherwood Fire

On the morning of July 22nd, I joined a strike team formed of four engines from the Olympic Region and three engines from Oklahoma to respond to the Sherwood fire in Wellpinit, Wa., a town within the Spokane Indian reservation. The fire was 300 acres at the time and had been going on for one day. We spent much of that assignment doing mop up of fires from the previous day. However, the third day was particularly active.

The day started with breakfast and briefing just like every other day. However, that day I worked with one of the firefighters from Oklahoma to protect the east flank(edge) of the fire. We accomplished this by using helicopters to drop buckets of water on large portions of the fire. This is colloquially referred to as “bucket drops” or “Aerial drops” if referring to planes and helicopters. Throughout this day I became particularly skilled in identifying and then communicating my position on a map through coordinates, visual markers and sometimes by waving a colorful cloth on the end of a stick. These bucket drops carried about 300 gallons of water and therefore were crucial in extinguishing particularly intense or inaccessible portions of the fire. Aerial drops can use either water or retardant each of which have pros and cons.

The next day, the Incident Management Team made the decision to drop fire retardant into a watershed which led to the community well for Wellpinit. For context there is an interagency rule which prevents fire retardant from being sprayed within three hundred feet of a waterway (USFS, 2000). However, that rule can be circumvented if human lives or property are in danger. In this circumstance, Fire was traveling southeast down drainage towards the well. If the fire had reached the well it would have put it out of service leaving the entire town without water in the middle of summer. For this reason, a decision was made to drop retardant across the watershed. It would require a formal study to identify if a significant amount of retardant made it into the water supply. However, it worried me that a main tactic used by wildland firefighters could have such a negative impact on the local environment. Any scenario would have unfortunate repercussions.

It was heart wrenching to see a situation such as the dropping of fire retardant in Spokane Tribe’s watershed. Protecting the watershed through fire retardant was the far lesser of two evils but still not a choice I envy having to make. I see the impacts

from this as potentially higher levels of Phos-CHEK, the particular retardant in use, negatively impacting Wellpinit's water supply. In this discussion I hope to dive into both what went into making the decision and what the potential affects may be.

The decision is, at its core, based on basic incident priorities. All firefighters are trained to protect lives, stabilize incidents, protect property, and protect the environment, in that order. The USFS echoes this in the guidelines: "Avoid aerial application of retardant or foam within 300 feet of waterways." Followed immediately by "This does not require pilots to fly in such a way that endangers his aircraft, other aircraft, property or compromise ground personnel safety" (USFS, 2000). This hierarchy of person, property, and then environment has, for some circumstances, been changed. For example, if there is a wall of flame preventing responders from rescuing victims, then they must first stabilize the incident before protecting life. This incidence, I believe, adeptly exhibits how the hierarchy can be changed by recognizing each component's relationship with the other. The issue I find is that there is a lack of recognition across fire response of how protecting the environment relates back to protecting lives, preventing incidents and protecting property. In this incidence in particular the retardant has potential impacts on human health through introduction to the community well and residents of Wellpinit wading through their local river. There is also the potential for the ammonium nitrate in fire retardant to foster more underbrush grow leading to further fires later (Tufts Now, 2020). More broadly fire retardant can damage the ecosystems of rivers and therefore the prosperity of industries which rely on those ecosystems such as fish. By accounting for environmental protection, firefighters will also inherently address each other incident priority.

With this critique it is important to critically analyze how much damage could have happened beyond my own pessimistic inclination. A 2014 study from the Forest Service (FS) concluded that both stream and ocean salmon had high mortality from Phos-CHEK given direct exposure. Now in this instance the retardant may or may not have been direct. Therefore, an environmental impact statement would be necessary to find a definite answer. This statement would require looking at the porosity of the soil, how much of the salts would filter through and run down the hill into the stream over the coming months. Also worth considering would be the dosage at which it is toxic upon ingestion. Currently the Forest service says it is not toxic but should not be ingested (Tufts 2020). In the end this leaves a pathway for future studies and efforts to create better solutions in the future.

In the end, the town and their water source were saved by the actions of the team created through a collaboration between the Bureau of Indian affairs (BIA) and the DNR. I remember particularly when the Incident commander came up to my table at dinner and thanked us for coming but also reminded us to recognize how special it was that the BIA had asked the DNR, a state agency, to come onto their land and help them out. It made me notice first how we are at an inflection point where federal agencies are just starting the work better together as well as it made me grateful to be able to have helped this community when they easily could have rejected it.

We finished our assignment there on July 29th and left to other fires in the region to finish what would be a two-week deployment. The final report from Inciweb on August 2nd says the Sherwood fire was 90% fully mopped up and finished growing at 12,56 acres (Inciweb, 2021).

Conversations with Ben

While working of the Sherwood fire, we stayed in a fire camp within the Wellpinit Powwow grounds. While there I spoke with a Forester from the DNR Olympic Region who was vegetarian like me. A primary thing we noticed in the fire camp was the reliance on prepackaged food, Styrofoam packaging, plastic bags to carry food, plastic utensils, and plastic water bottles to drink from. While certain precautions are necessary to prevent disease transmission in fire camps, which are already notoriously dirty, it struck us how impactful this would be on the environment we were working to protect.

Furthermore, we spoke about the irony behind how the primary response to fires was to drive big polluting trucks to the scene, and then use hundreds of gallons of water to put it out. The practices currently used by the fire service to put out fires also serve to promote them into the future. Our conversations often ended in grasping for clever solutions which would minimize contributions to climate change and droughts.

Youngquist Fire

On August 19th my engine was called for a mutual aid to the neighboring engine's district for a fire which was notable in a few ways. Our engine responded to a 1 acre fire on the hill above Sequim, Washington. Upon arrival local fire department personal had already established command and my engine tied in the East division manager for briefing. E-1101 was assigned to do a direct attack on the Southeastern flank of the fire as part of a strategy to anchor, flank, and pinch.

The first thing I noticed was the severity of which everything had burned. This fire had run through a field of sword fern and then became established in the trees. Pacific rainforest fuels, particularly ferns do not burn easily due to a high moisture content. However, when they do burn, they burn intensely hot and are difficult to extinguish. The result was a barren landscape with groups of just the fern's spines shooting out of the ground like charred chia pets. Further on, I noticed a piece of electrical wire that was laying on the ground underneath the power lines which transected the burned area. I made note of it and reported it up the chain of command. A decision was made that the powerlines were still intact and did not pose a hazard and the section of wire was most likely there before the fire,. However, it would be flagged off as evidence. The predominate theory was that the fire ignited from a mail thief who had stolen from mailboxes at the bottom of the hill and then burnt the evidence. This suspicion led many locals to drive by and try to squeeze information from us or vent their frustrations about the poor to us. These three events, the devastation of sword ferns, impacts of electrical wires, and impacts of managing a potential crime with the community impacted how I think about fire going forward.

The devastation that I saw connected with me in that it was the direct opposite of the forest of sword ferns I used to play in as a kid. It evoked a deep sentiment within me of a need to protect an environment similar to that which I grew up in. Upon further analysis I do realize that infrequent, severe fires are good for ecosystems. However, in this circumstance, resources were dispatched to the fire to protect the powerlines and the houses which were nearby- an Anthropocentric reasoning which aligns with my desire to save ecosystems similar to my childhood. This leads me to recognize that the primary motive behind the wildland services priorities: protect life, property and then the environment are primarily anthropocentric. Further consideration of ecosystem functioning is a potential blind spot of current fire service operations.

The impact of electrical wires is a recurrent problem within wildland firefighting. Electrical powerlines start a multitude of fires each season. Perhaps the best example is a study in my senior year where I discovered the 2021 Dixie Fire started on the same powerline 10 miles north of where the 2018 Campfire started (Ramsey et al, 2020) (PG&E, 2021). These two fires were the deadliest and the largest single wildfires in California state history respectively. Most infuriating is that PG&E had already been found guilty of starting the Campfire and implemented changes to prevent future wildfires (Ramsey et al. 2020). This

personal interaction, led to my research this final year and has led to a desire to make powerlines safer for the public and surrounding ecosystems.

Lastly, dealing with public interactions has never been my strong suit, particularly ones involving angry citizens with undertones of class biases. My impression from this was the dividing impacts that fire can have on a community if interpersonal connections are not made before an incident such as this happens. Further work within community building would also help combat the negative impacts I felt here.

Conclusion

Fire service has left a lasting impact on me and my career. I will continue learning through firefighting for the foreseeable future and certainly use it to better the rest of my career. My time has left me with a few realizations for the future. Primarily, Firefighters are a backbone of America's response to climate change. As the conditions for severe and intense wildfires continue to rise (Halofsky et al., 2020), Firefighters will be relied upon more and more to fight what could have been mitigated otherwise. Robust systems thinking is necessary for the DNR and other organizations to stay prepared for how climate change will impact demand on firefighters.

Secondly, ecological considerations are minimally taken into account while fighting fires, often trumped by the higher priorities of life safety and property protection. I would like to further study the connections between protecting life, property and the environment and the effects of neglecting one to save the other. By quantifying the impacts to life or property by damaging the environment, I hope to push for stronger legislation and more creative solutions to combat wildfires.

Lastly I learned about the demeanor of firefighters while I assumed going in many or most firefighters cared about the environment, I soon learned many were simply looking for a paycheck. This leads me to conclude that solutions in future wildfire mitigation should not rely solely on altruism and incentives to protect the environment. Rather clever solutions based on increasing wages and/or more universal American values will be more effective.

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Appendix



A. Wylo viewpoint (Original)



B. Brushing project (Original)