

# SKY ANCHOR

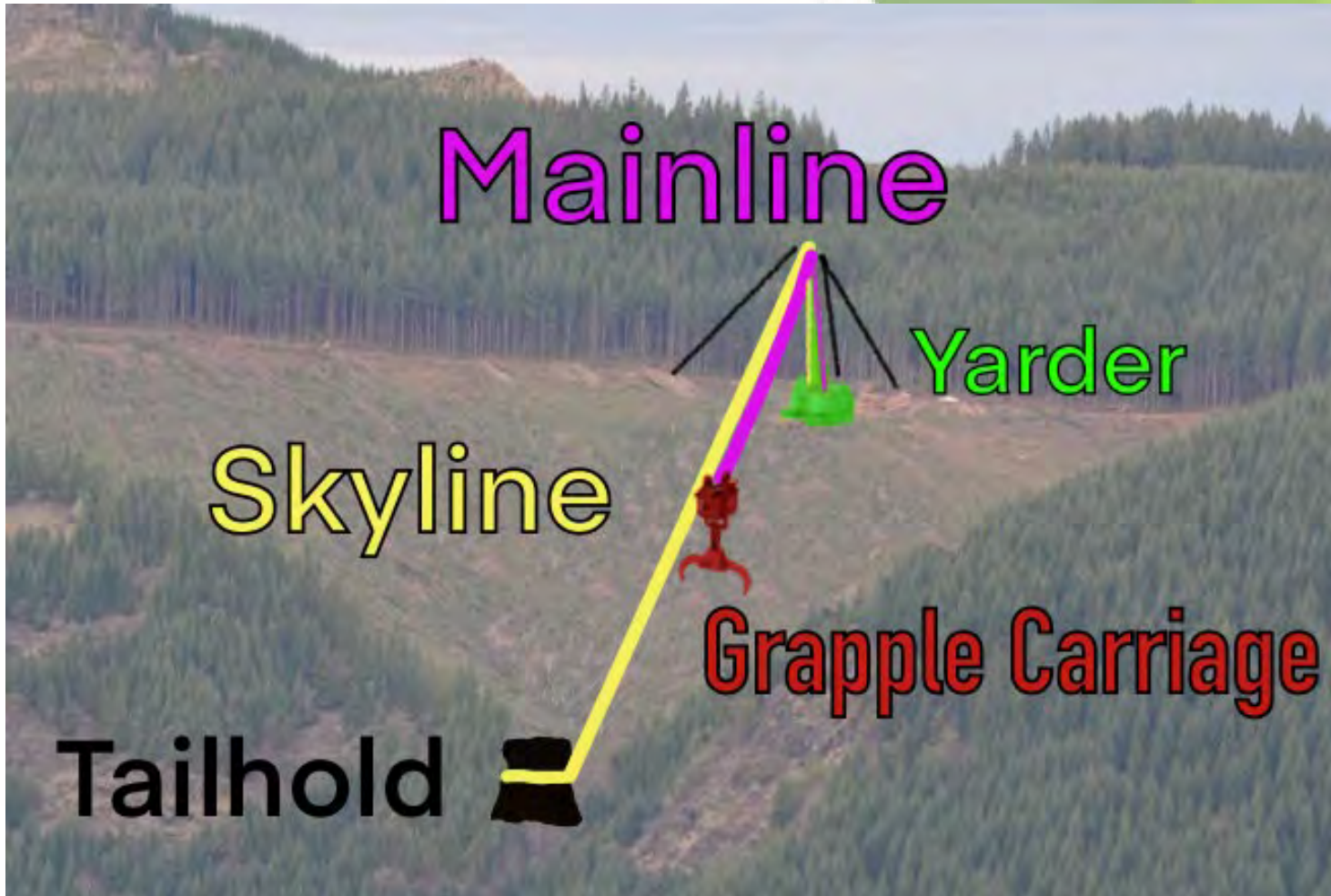
Cable Harvesting Innovation



Presented by Dan Clark  
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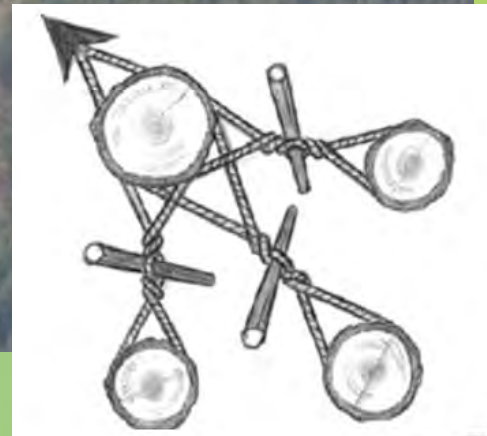
## Grapple Yarder – single corridor per tailhold



- *The yarder sits on the landing at the top of the unit*
- *A skyline cable is secured to the yarder and attached to a stump or other fixed tailhold at the bottom of the unit*
- *The mainline, is connected to the carriage and is used to pull the carriage back to the yarder*
- *The grapple carriage is affixed to the skyline (via pulley system) and moves down the skyline into the unit, to collect logs and bring them up to the landing*

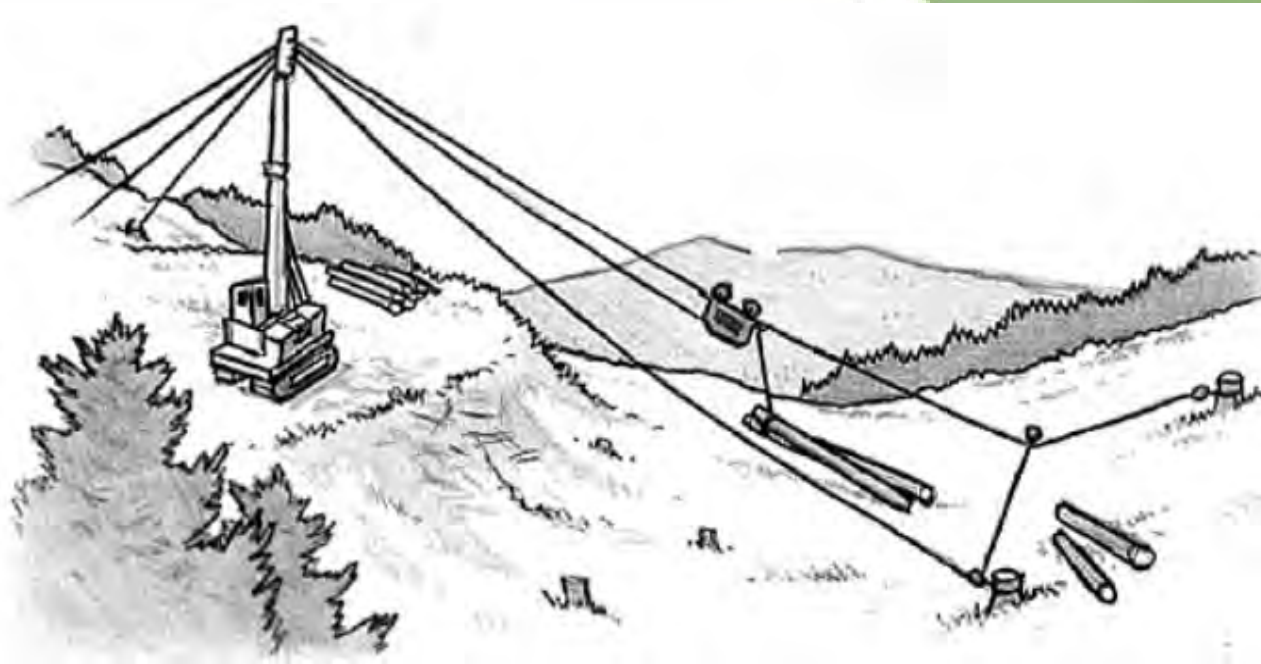
# Grapple Yarder – multiple road changes required

## Road changes



- *Once all logs within reach are cleared in the yarding corridor or 'skyline road', it's time for a 'road change'. The cable is then slacked which allows the hook-tender to release and move the tailhold over to begin a new road*
- *The road change process can be extremely time consuming, laborious, and dangerous due to the sheer weight and length of the cable and various obstacles such as bluffs and rivers*
- *Often in younger adjacent plantations; complicated, multiple stump tie back anchors are required, involving more time and exposure to risks for the Hooktender*

## Examples of systems that simplify road changes



*The Dutchman system uses the haulback line connected to a block on the skyline to pull the skyline to the side, essentially to a new logging road (grapple not pictured). Quick “road changes” without having to rig a new tailhold*

*Safe work areas are impacted by increased bite area between the lines would not be in the clear*



*Utilizing mobile tailholds, when access is available can make for quick road changes*



*Using drones to layout cable roads is more efficient for road changes and required less physical work*

# What is the “Sky Anchor” concept?



Weyerhaeuser’s Harvest Functional Team was tasked to move toward full mechanization throughout all logging systems.



Improving safety by getting boots off the ground, reducing exposure to high-risk operations.



Mechanized grapple logging can be more productive. Although, without a mobile tailhold or the ability to forward logs under a fixed tower/tailhold, it can be difficult to maintain high production rates.

The Sky Anchor utilizes a secondary yarder to suspend a drift carriage on its skyline, creating a mobile tailholding system capable of efficient road changes, and reducing external hanging distances.

**Secondary yarder  
Skyline**

**Drift carriage =  
"Sky Anchor"**

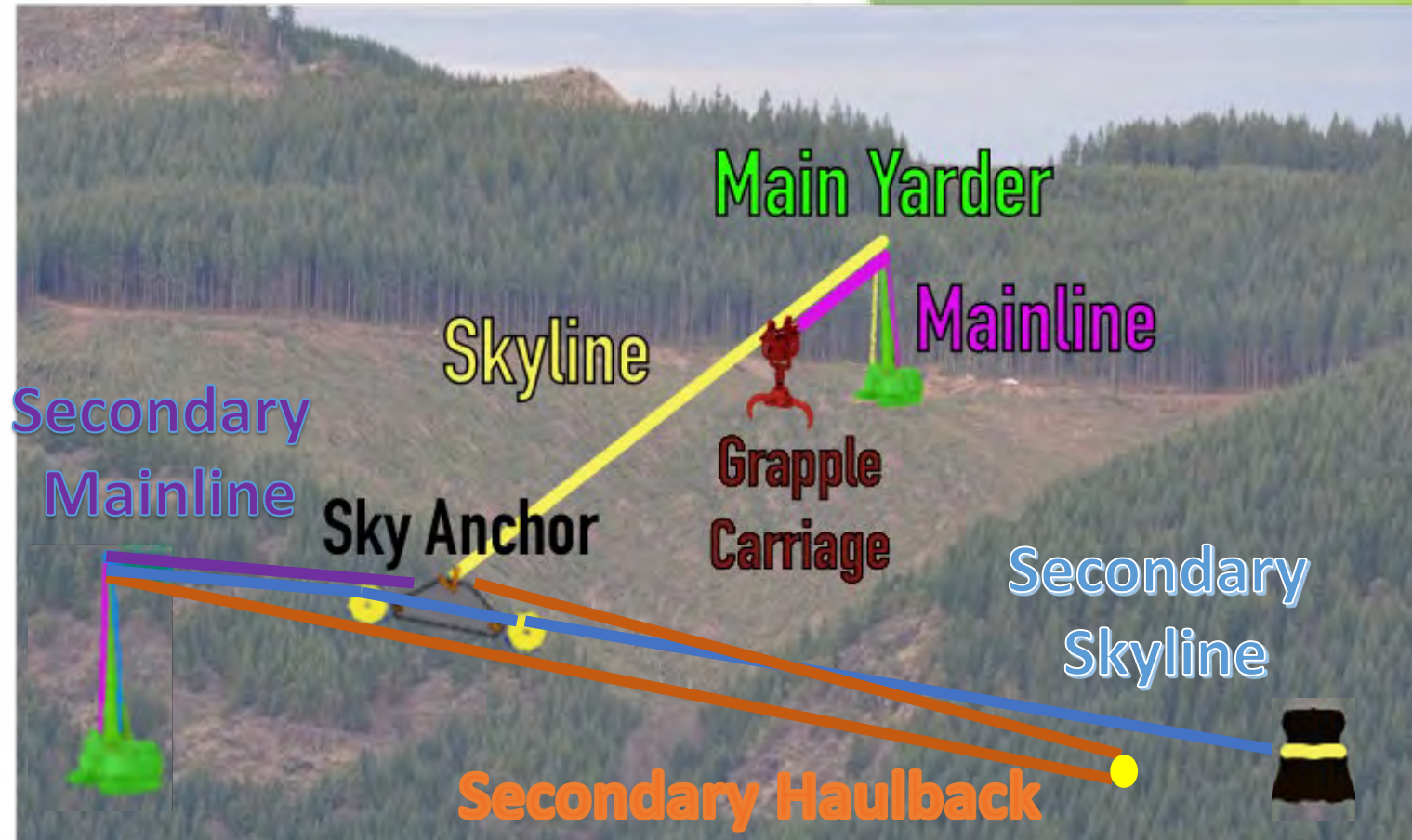
**Secondary Mainline**

**Secondary  
Haulback line**

**Primary yarder w/  
Running Skyline/Haulback**

**Primary yarder skyline can also be shackled directly to  
Sky Anchor for Standing or Live Skyline set-up**

# Grapple Yarder – Sky Anchor



- The main yarder is still at the landing, its skyline is now attached to the Sky Anchor on the skyline of the secondary yarder
- When it's time for a road change. The hooktender starts the secondary yarder to slack or tension the haulback or mainline to maneuver the Sky Anchor to a new road
- The road change process is now extremely efficient. It takes less than 30 seconds for a road change vs hour(s) before
- Can use running or live skyline on main yarder with slight modification to the Sky Anchor (drift carriage/shotgun carriage)

# Tension readings w/Brian Tour Aug 4th 2022

Note lateral deflection  
of secondary skyline

Edge of unit

Main Yarder (120 Madil swing yarder)  
3/4" swedged Skyline & Mainline  
Breaking strength = 70,000 lbs SWL = 23,300 lbs  
Static working tension = 12,000 lbs  
Peak operating tension = 18,355 lbs

- Radio controlled hydraulic grapple
- Guylines could be unintentionally over tensioned to take "bounce" out of the system, could pull stumps if tightened to much

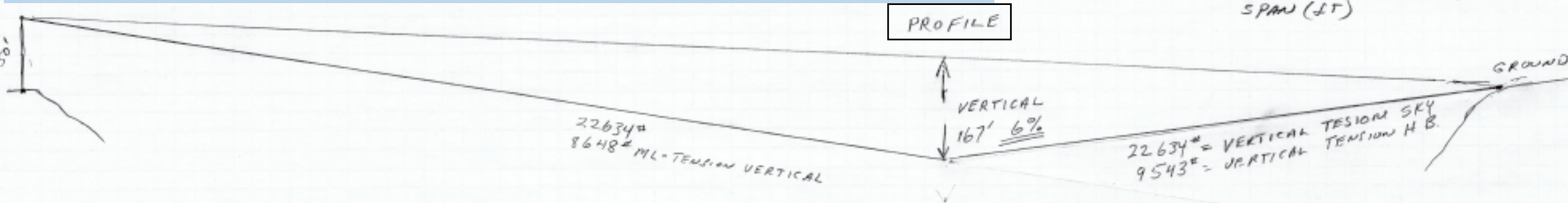
Anchor Yarder (TMY 70) Skyline Tension  
1 1/8" swedged Skyline  
Breaking strength = 150,000 lbs. SWL = 50,000 lbs  
Static working tension = 38,000 lbs  
Peak operating tension = 60,000 lbs  
3/4" Haulback and Mainline under tension within SWL  
Use snapguy line under normal tension



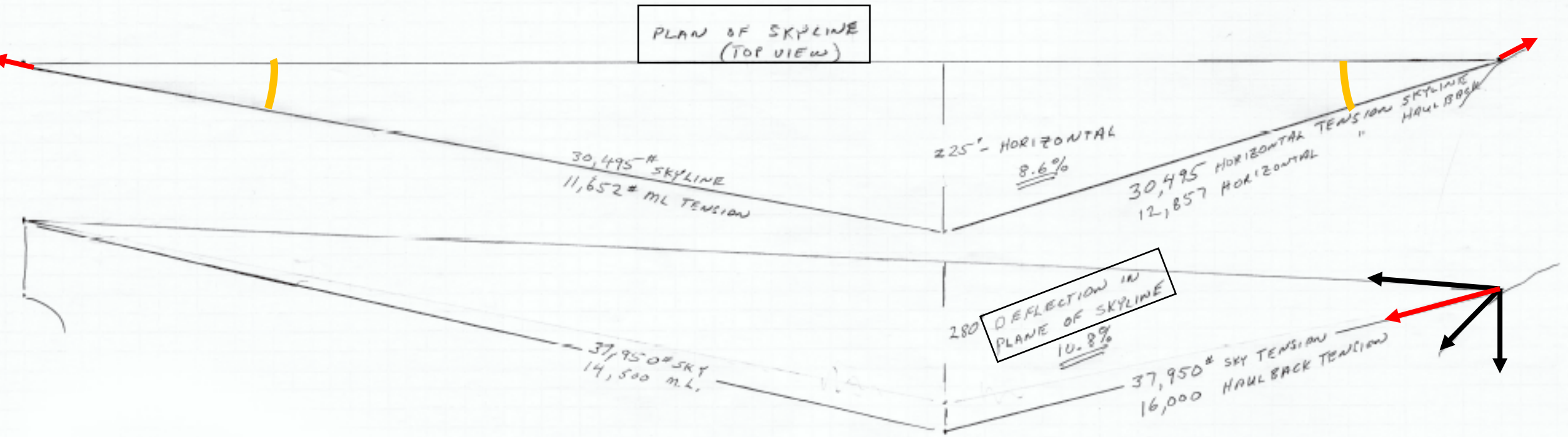
# Logging Mechanics

Traditionally we analyze the vertical forces and deflection for payload analysis

$$\% \text{ DEFL} = \frac{\text{ACTUAL DEFL. (ft)}}{\text{SPAN (ft)}} \times 100 =$$



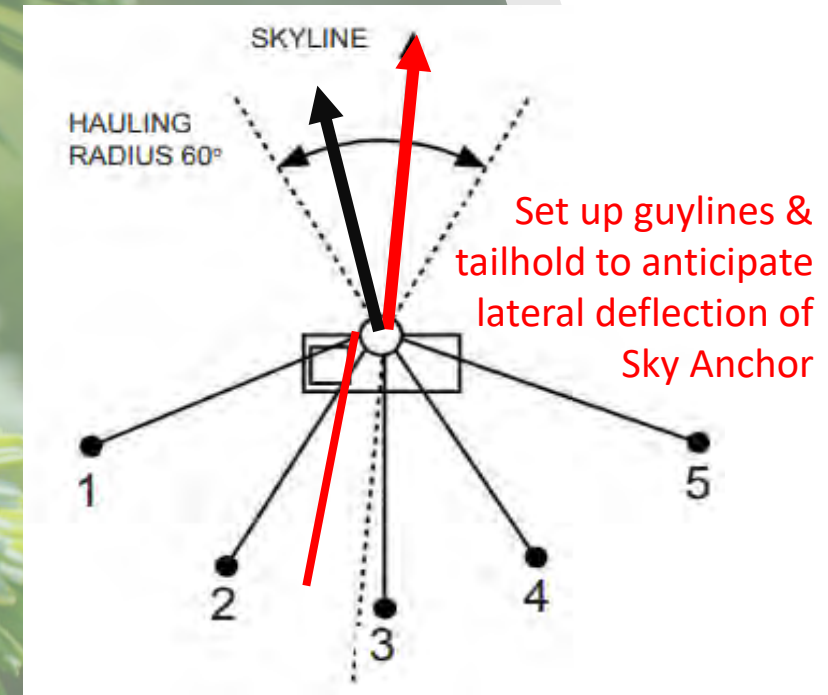
To maintain force equilibrium at the Sky Anchor, the secondary skyline now has considerable lateral forces



Deflection is still a good for payload, but it comes with greater lateral forces on the tower and in varying directions, making the guyline angles more critical to support to load.

# Key learnings for secondary skyline w/ Sky Anchor

1. *Set up the Secondary yarder and its tailhold close to level in elevation, and the Sky Anchor should be perpendicular to the primary skyline*
2. *Turn the secondary yarder in the direction where its skyline will point, the skyline will deflect laterally ~15-25 degrees depending on how close the drift carriage is to it. If using tail cat also consider the skyline angle when it is under tension to angle it appropriately*
3. *Keep the Sky Anchor within the middle half of the span of the secondary skyline. Would not want uneven "guyline" lengths for the Sky Anchor*
4. *Set brakes on secondary yarder to peel, do not set pressure too high and lock the maxi brake.*
5. *Possibly able to leave secondary yarder tower/tube lowered (check manufactures' recommendations)*
6. *May be able to use smaller equipment for the primary yarders (harvestline, yoader, etc.) with the shortened external hanging distance, However, we recommend 1" line or greater for the secondary yarder*



# Safety concerns and limitations with using a Sky Anchor

- **DO NOT USE SKY ANCHOR with people on the ground setting chokers.** Everything is in the bite. When the lines are all up there is no place to get in the clear. If the crews need to switch carriages to use chokers, they need to lower the drift carriage and tie off the end of the skyline to a tailhold
- Safe work area around secondary yarder- Clear out the area of overhead hazards, guy trees, and snags. May need to cut a landing or a short corridor if this landing is in timber
- Checking all guylines/tailhold daily, includes both yarders, their guylines, and the tailhold
- Under high tension for long durations the skyline of secondary yarder can wear and brake at the Sheeve; daily run the skyline out/in and ensure the sheeve swivels freely
- Additional considerations for FAA notifications with different line locations

## What does it cost?

*"No one rents yarders!"*

- *What's the price of a dependable, maintained working yarder that will have to be replaced eventually.*
- *Replace an additional skyline, haulback, and mainline depending on how much it get used*
- *Fuel <5 gal/week, depending on road changes*
- *Extra time to mobe, set up, turn the secondary yarder*
- *Extra vehicle & rigging trailer would be handy*
- *Additional line truck time.*

## What does it save?

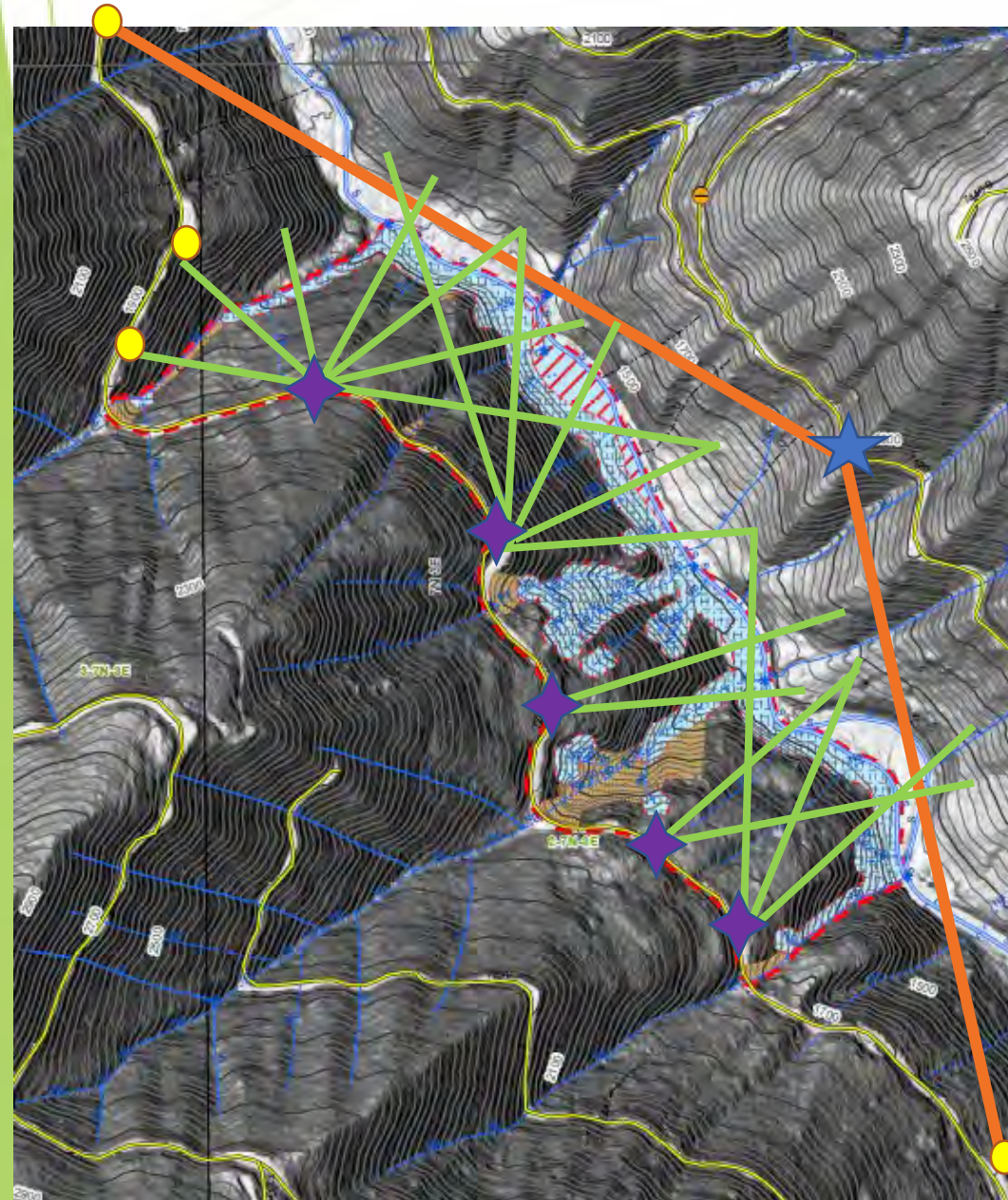
- *On a single 45-acre unit it saved over 1000 exposure hours from boots on the ground!!*
- *This will also lower the risk rating for those hours worked, reducing the workers compensation insurance costs, saving will be significant*
- *<1 minute road changes = more productive hours each day!*
- *Only ran on a few jobs so far, but seeing an extra 2 to 4+ loads per day. Still to early to define! (variable based on piece size, bunched or hand-cut, yarder operator experience)*
- *Will save tethered forwarding hours*
- *When a log drops the lines do not jerk, they float/bounce. Easier on the equipment*

## What other benefits are there?

1. *Ideal for settings that would require skyline extensions to get deflection*
2. *Most beneficial for where there are many road changes or sensitive buffers*
3. *To avoid hanging over a highway or road*
4. *Where tailholds are not available (neighbors, reprod, etc)*
5. *Bunched wood preferred*
6. *Lights on grapple allow for earlier start in the dark with no crew on the ground.*
7. *Early start during fire season = more production! Blocks are all suspended, risk of fire is lowered*
8. *Switching to grapple logging, your contractor may be able to split the crew and spread capacity of limited workforce. This also provides for time to cross train and develop employees to operate equipment*
9. *Helps to log units faster, builds better partnerships with contractors by providing more work and getting more production!*

# Unit layout and Planning

- *Planning units for Sky Anchor need to be pure Grapple unit (not setting chokers)*
- *Large primary landings, processor becomes bottle neck, need to plan for the secondary yarder landings: permits/notification, clearing, building, etc*
- *The lines will pull towards the main yarder, so the secondary skyline may need to be 200' or more behind the unit edge*



- ◆ Primary yarder
- ★ Secondary Yarder
- Tail Cat

# Looking ahead for potential concerns

- *More lines over roads and haul routes, flaggers, or delays?*
- *Need to assess how/if fire trailers would be required at the secondary yarder. Will an extra fire watch be needed? How will regulators view this system?*
- *Concentrated line rub and broken branches along secondary skyline corridor. Get ahead of negative perceptions with regulators, this impact is concentrated but lower than having dozens of corridors to tailholds.*
- *As Contractors implement new systems/set-ups we need to understand the new risks, bite areas, and different loads. Work within guyline spec sheet for both yarders!*
- *For WA need to permit operating over unstable slopes with secondary skyline, expands the operations work with State Foresters.*





**QUESTIONS?**



**THANK YOU!**

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